



MODEL 1453 & 1453A

PRINTER

(PREFIX 502)

Beckman

Operating and Servicing Manual

Electronic Instruments Division



MODEL 1453 & 1453A
PRINTER

(PREFIX 502)

SERIAL No. _____

Beckman

INSTRUMENTS, INC.

ELECTRONIC INSTRUMENTS DIVISION

RICHMOND, CALIFORNIA • 94804

AUGUST 1962

(REV. 12-69)

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Electronic Instruments Division
3900 River Road
Schiller Park, Illinois 60176

EASTERN

Beckman Instruments, Inc.
Electronic Instruments Division
U.S. Highway #22 at Summit Road
Mountainside, New Jersey 07091

MODEL 1453A

PLEASE NOTE

For information concerning Models 1453 and 1453A compatibility with integrated circuit voltage levels, refer to Appendix 4, located at the rear of this manual.

Color control at integrated circuit voltage levels is available as a factory modification.

MANUAL REVISIONS

Beckman Instruments is continually striving to provide better quality in its products. As a result, changes are initiated to improve performance and specifications.

Several changes may have been incorporated in your instrument since the manual was last printed. If this is the case, may we impose on you to make these changes to your copy of the manual? All changes are given in the form of addenda, one addendum for each change. They are printed on green-colored paper and inserted, in letter or number sequence, immediately following this page. If a change does not apply to your instrument, please disregard the associated addendum.

PREFIX NUMBERS

The prefix number denotes a generation of manuals. All addenda for a certain prefix number are incorporated in the manual before reprinting and the number increased by one (e.g., "Prefix 500" becomes "Prefix 501").

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SECTION 1

INTRODUCTION

1.1 GENERAL DESCRIPTION

The Model 1453 and 1453A Printers are identical. They convert electrical data into printed characters on a paper tape, printing up to 12 digits in black or red at a maximum rate of three lines a second. The standard printer has a maximum capacity of eight digits and will accept binary-coded decimal data (BCD) of 1-2-2-4, 1-2-4-2, and 1-2-4-8 weighting. The Model 1453 Printer is shown in Figure 1-1.

Separate plug-in modules, coupled to the main input cable by separate connectors, control each column and permit arrangement of the digits in any order.

Besides the standard four-line BCD modules, ten-line modules are available that will accept both decimal and BCD data. Both types of data can be entered on the same line with these modules.

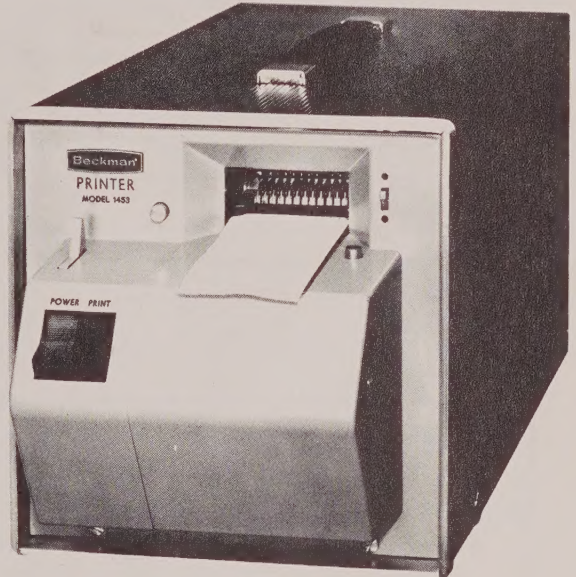


Fig. 1-1. Model 1453 Printer.

1.2 SPECIFICATIONS

Specifications for the Model 1453 Digital Printer are shown in Table 1-1.

Table 1-1. Specifications

Column Capacity	8 to 12 digit columns.
Digit Printout	0 through 9, plus column suppression (blank).
Printing Rate	3 lines per second maximum.
Accuracy	Identical to data input sources.
Control Voltages	Binary 0: -12 to -50 volts (max.) Binary 1: 0 to +50 volts (max.)
Input Code: FOUR-LINE BCD	1-2-2-4, 1-2-4-2, or 1-2-4-8. For 2 megohms (approx.) source impedance per line; Binary 0: -12 to -50 volts (max.) Binary 1: 0 to +50 volts (max.) For 100K ohms (approx.) source impedance per line; Binary 0: -8 to -50 volts (max.) Binary 1: 0 to +50 volts (max.)

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- Introduction -

Table 1-1. Specifications (continued)

TEN-LINE BCD	Binary 1: 1 wire Binary 0: 9 wires
Input Resistance	FOUR-LINE and TEN-LINE Code Modules: Negative inputs: 10 megohms (approx.) Positive inputs: 200K ohms (approx.)
Code Control	Normally 1-2-2-4 BCD; single line grounded for 1-2-4-8 (1-2-4-2) BCD (1 mA maximum, +10 volts open circuit).
Color Control: Manual Electrical	Two-position lever selects red or black printout. Red: Binary 1 or open circuit Black: Binary 0 Input resistance: 2 megohms (approx.)
Column Suppression	Pin 10 grounded for each column suppressed. (3 mA maximum, +10 volts open circuit) Removal of input code module also suppresses column.
Print Command	Change from binary 1 to binary 0. Binary 0: 100 ms minimum after print command Binary 1: 15 ms minimum before next print command Source resistance: 1 megohm (max.)
Inhibit Reset Command	Occurs no more than 50 ms after print command; 200 ms maximum duration.
Internal Ground	Internal ground is isolated from chassis ground, and can be biased to ± 100 volts.
Printing Ribbon	Burroughs adding machine ribbon, 10 key, black and red, medium 7/16 inch (Beckman No. 279-812854).
Paper	Roll tape: Standard 2-1/4 inch (Beckman No. 884-823320) Fan-folded tape: (Beckman No. 884-410460)
Power Requirements	117 volts rms $\pm 10\%$, 60 Hz. Approximately 0.7 amps, 45 watts
Dimensions: Printer Portable Case (M-1) Rack Adapter (K-1) Bench Cabinet (L-1)	8 inches high; 8 inches wide; 16 inches deep 10 inches high; 9 inches wide; 13 inches deep* 8-3/4 inches high; 19 inches wide; 15-1/4 inches deep* 10-5/8 inches high; 20 inches wide; 15-7/8 inches deep* *(Add 3-1/2 inches to include extended front of printer.)
Net Weight	Portable Case (M-1): 5 pounds Rack Adapter (K-1): 15 pounds Bench Cabinet (L-1): 30 pounds Printer: 30 pounds

SECTION 2

OPERATION

2.1 INSTALLATION

CAUTION

Do not operate printer before removing the three shipping screws and spacers.

During shipment, the printer mechanism is secured to the frame with three shipping screws and spacers. Remove them as follows:

- 1) Remove printer from its case as described in paragraph 4.1 (Servicing Section 4).
- 2) Turn printer upside down as shown in Figure 2-1.
- 3) Locate three red-painted screws and their spacers (Figure 2-1).
- 4) Hold each spacer in turn with a pair of pliers while removing the screws. Remove spacer.
- 5) Keep screws and spacers. Use them when shipping the printer.

CAUTION

The printer works only when horizontal. Do not operate it with the front panel more than 30 degrees from the vertical.

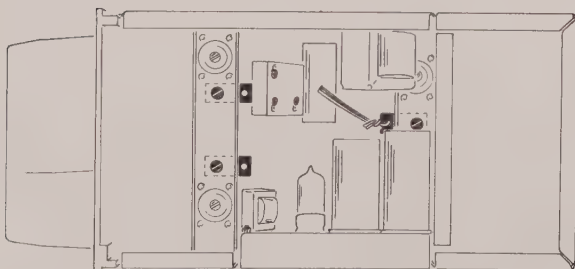


FIG. 2-1. Bottom view of Printer showing shipping screws and spacers.

2.2 MANUAL CONTROLS

With the exception of the code weighting switch on the ten-line code module described in paragraph 3.5.3, the operating controls are on the front panel. Their positions and functions are shown in Figure 2.2.

2.3 ELECTRICAL CONTROL

Table 2-1 summarizes the electrical controls. In this table, binary 0 means 0 to +50 volts (maximum). Note that power ground is not the same as signal ground. See Master Schematic on page 5-3a (dwg. no. D419670).

Pin numbers in the table refer to the individual connectors on the printer. To find the corresponding pins on the main connector, see the Four-Line Input Cable Schematic Diagram on page 5-5b (dwg. no. 62-D-56).

2.4 INSTALLING INPUT CODE MODULES

Follow the arrangement shown in Figure 2-3 when installing modules for use with Beckman data sources such as counters and digital voltmeters. With sources other than Beckman instruments, arrange the modules and connectors to meet requirements.

The twelve sockets marked XA101 through XA112 correspond to the twelve digit columns 1 through 12 (see Figure 2-4). Connectors P104 and P105 are for CONTROL and COLOR, respectively. The printer is supplied with seven four-line input code modules and a main cable that is terminated in nine connectors marked 1 through 8 and C. In this standard configuration, the Model 1453 prints up to seven digits of data. For an eighth digit, insert an extra module.

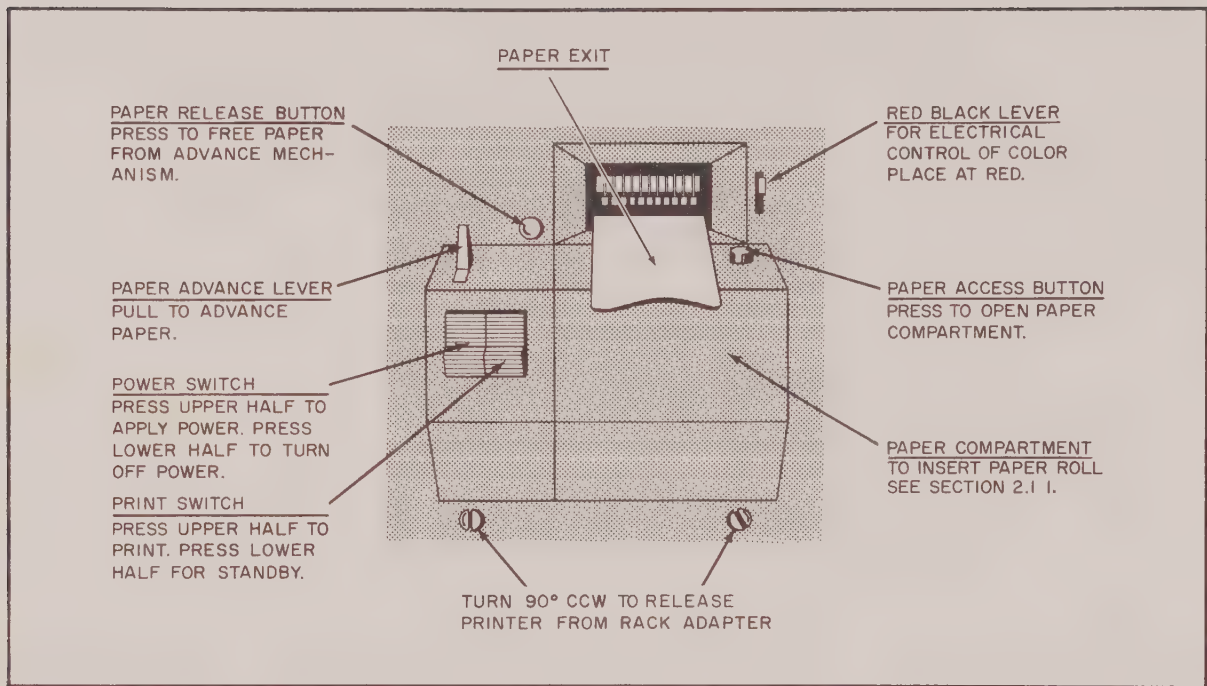


FIG. 2-2. Front-panel controls and connectors.

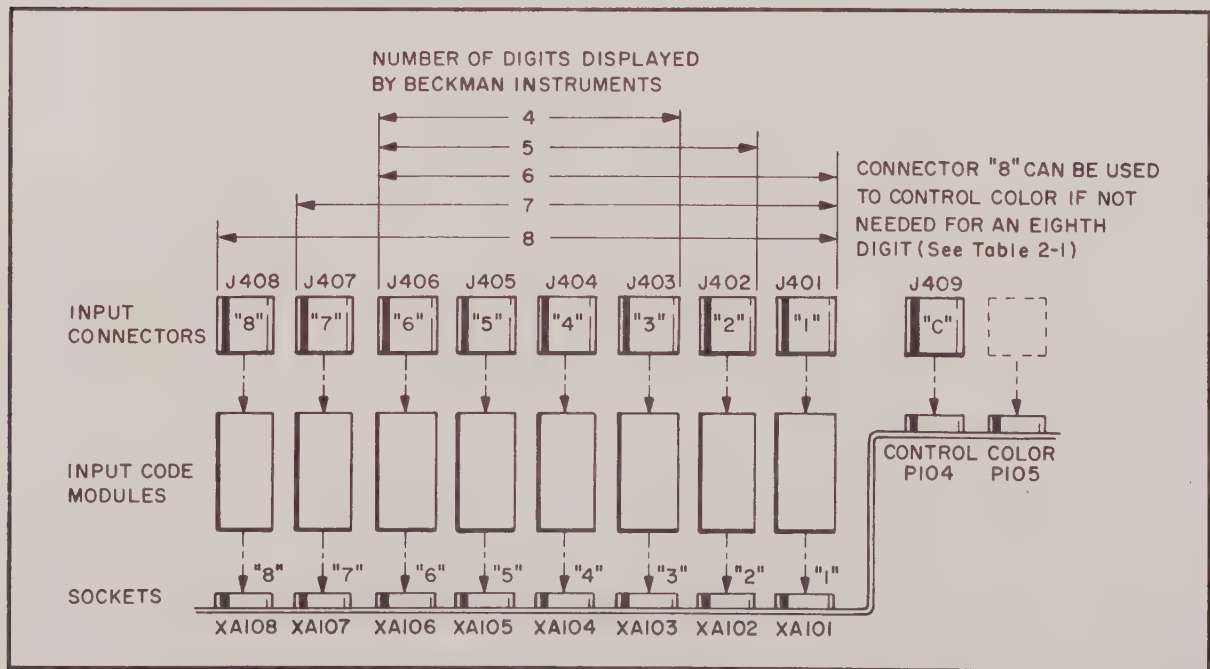


FIG. 2-3. Typical arrangement of input code modules and connectors.

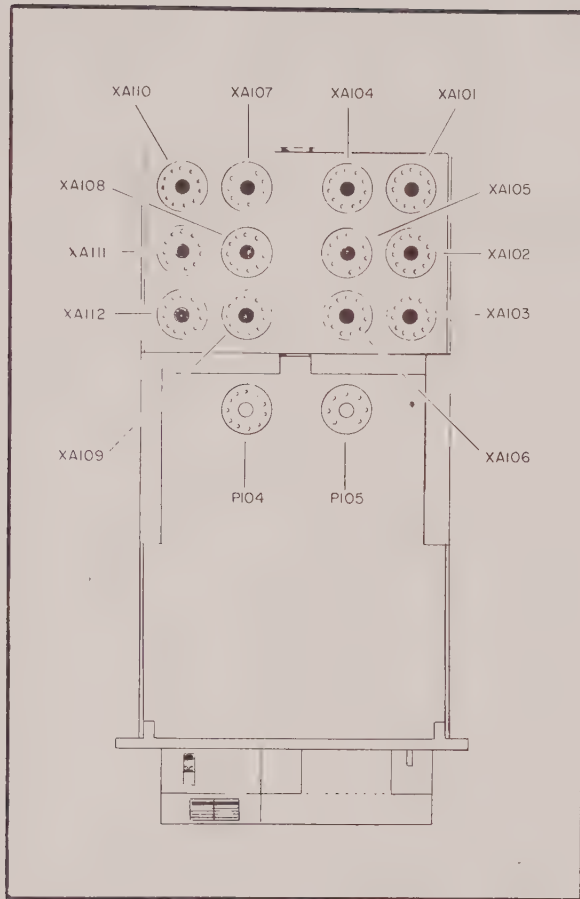


FIG. 2-4. Socket location diagram.

Another version, supplied on special order, has the full complement of twelve pawl magnets and will print up to twelve digits. To identify either version, note whether 8 DIGIT or 12 DIGIT is stamped on the top of the pawl magnet assembly.

2.5 CODE CONTROL WITH FOUR-LINE INPUT CODE MODULES

The code accepted with four-line modules depends on whether or not the code control line is grounded (see Table 2-1). Beckman instruments automatically provide the proper code control signal.

2.6 USING DECIMAL DATA WITH TEN-LINE INPUT CODE MODULES

Decimal input to a ten-line module is on nine lines, each wired to a separate pin, numbered 1 through 9 on the module connector (P201). Pin 10 is used for column suppression (see Table 2-1). A binary 1 voltage on any one line represents the digit corresponding to the pin number. Binary 0 on all lines represents the digit 0.

To operate the printer when all modules are ten-line:

- 1) Program printer for 1-2-4-8 code (see Table 2-1).
- 2) Move switch on each module to position marked 1-2-4-8.

2.7 USING MIXED DECIMAL AND BCD DATA WITH TEN-LINE INPUT CODE MODULES

For partial decimal and partly BCD data, proceed as follows:

- 1) Program printer for BCD code used (see Table 2-1).
- 2) Set switch on each module receiving BCD input to 1-2-2-4 (regardless of code programmed).
- 3) Set switch on each module receiving decimal input to 1-2-2-4 or 1-2-4-8 (according to to BCD code programmed).

2.8 USING BCD DATA WITH TEN-LINE INPUT CODE MODULES

BCD input to each ten-line module is on four lines, wired to pins 1, 2, 4, and 6 (corresponding to weights 1, 2, 2, and 4, and 8, in that order) of module connector P201.

Table 2-1. Electrical Control Functions

CONTROL SIGNAL	FUNCTION
Print Command	With print switch at PRINT, a change from binary 1 to binary 0 at pin 5 of J409 starts a printing cycle. Binary 0 must be maintained for 100 milliseconds minimum to start the cycle. The print command line must return to binary 1 for at least 15 milliseconds before next cycle can be started. (Source resistance is one megohm maximum.)
Code Control	Programs printer for input data of 1-2-2-4, 1-2-4-2, or 1-2-4-8 weighting (1-2-4-2 and 1-2-4-8 are the same to the Model 1453). A contact closure from pin 7 of J409 to power ground allows 1-2-4-2 or 1-2-4-8 data to be used. The printer responds to 1-2-2-4 code with pin 7 ungrounded.
Inhibit Reset Command (Pin 1 of J409)	Inhibits data source from resetting until all data printing is complete (generated by the printer). Produces a contact closure through a 220 ohm resistor to power ground (occurs no more than 50 milliseconds after print command and lasts no longer than 200 milliseconds).
Color Control	Permits electrical control of printing color. The RED/BLACK lever must be at RED for electrical control of color. Binary 1 or open circuit at pin 6 of J408 produces a red impression; binary 0 a black impression.
Column Suppression	Produces a blank impression in the column controlled. A contact closure to power ground from pin 10 of the top connector (P201) of any module will suppress the column. Note that pin 10 of connectors 1, 2, 7, and 8 is wired to the main connector. Removing a module will also suppress the corresponding column.

To operate the printer with BCD data:

- 1) Apply data to pins 1, 2, 4, and 6 of P201.
- 2) Connect pin 11 (a source of binary 0 bias) to pins 3, 5, 7, 8, and 9.
- 3) Set switch on each module to 1-2-2-4 regardless of the actual input code.
- 4) Program printer for 1-2-2-4 or 1-2-4-8, as described under Code Control in Table 2-1.

2.9 IDENTIFYING CONNECTIONS TO INPUT CABLES

Wiring diagrams for the four-line and ten-line cables, respectively, are given on pages 5-5b and 5-6b (dwg. nos. 62-D-56 and C405888).

2.10 CONNECTING A DATA SOURCE

To use the printer with a Beckman Instrument, plug the input cable into the DIGITAL RECORDER

socket on the instrument. This socket carries all the data and control signals needed for automatic operation of the printer.

When using the Model 1453 with Series 6200 and 6300 instruments, refer to the Appendix "Model 1453 Compatibility with Integrated Circuit Voltage Levels" (at rear of manual).

For data sources other than Beckman instruments, use the input cable schematic diagrams to determine appropriate cable connections.

2.11 INSERTING THE PAPER TAPE

Follow these steps to put a roll of paper into the printer:

- 1) Press paper access button (see Figure 2-2).
- 2) Let paper compartment drop forward.
- 3) Place a roll of paper in the spring-loaded holder so that paper feeds from the bottom toward the mechanism.
- 4) Bend end of paper up. Fold it, making a straight leading edge.
- 5) Feed end into paper guide below platen (rubber roller).
- 6) Move paper advance lever forward several times until paper appears in paper exit. Make sure paper is between inked ribbon and platen.
- 7) Close compartment.
- 8) Press paper release button and pull paper out until straight.

2.12 REPLACING THE RIBBON

To replace the inked ribbon, follow these steps while referring to Figure 2-5:

- 1) From each side of the printer remove the upper of the two panel-retaining screws; then loosen the screw directly below it.
- 2) Tip the front panel forward.

- 3) On each spool, swing the ribbon spool retainer away from the ribbon spool post; then slide off the spool.
- 4) Remove and discard the old ribbon and spools.
- 5) Place the spools on the spool posts so that the ribbon feeds toward the bottom of the spool.
- 6) Check that the driving stud in each ratchet wheel is engaged in one of the holes in the spool; then lock the spool with the retainer.
- 7) Thread the ribbon over the guide stud and through the ribbon guides as shown.
- 8) Take up any slack in the ribbon by turning the spool that is free. Do not use force.
- 9) Swing the front panel back into place and replace the two retaining screws.

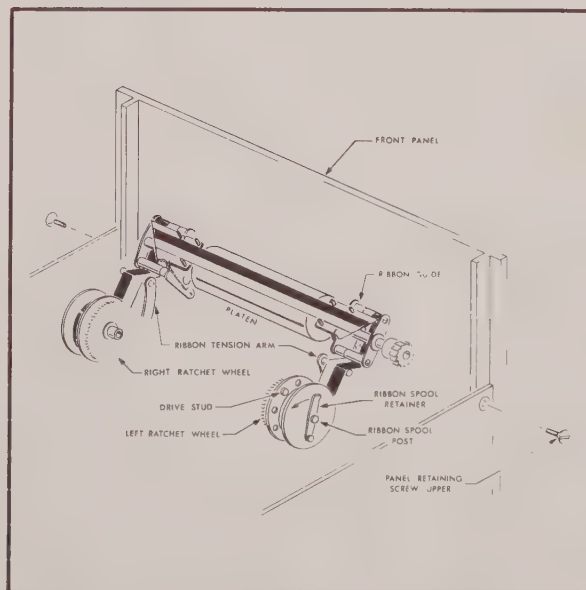


FIG. 2-5. Guide to ribbon replacement.

2.13 APPLYING POWER

Before connecting the printer to the power line:

- 1) Set POWER switch to OFF (see Figure 2-2).
- 2) Set PRINT switch to STANDBY.
- 3) Plug power cord into 117 volt ac outlet.

NOTE

For 230 volt operation, place switch S105 in 230 volt position. (F101 and F102 must be changed to 1/2 amp rating.)

- 4) Set POWER switch to ON.
- 5) The motor starts with the clutch disengaged. A light illuminates the paper exit indicating that the printer is ready for use.

2.14 OPERATING THE PRINTER

Complete steps outlined in paragraph 2.1 before operating the printer. To record data, set PRINT switch to PRINT. The printing cycle will take place upon receipt of an external print command.

CAUTION

Set PRINT switch to STANDBY before turning POWER switch to OFF. This precaution ensures that the bowl magnet assembly is mechanically locked in the energized position to prevent dust and lint from accumulating between the armatures and magnets.

SECTION 3

THEORY OF OPERATION

3.1 BASIC DESIGN

The Model 1453 is a motor-driven printing machine controlled by electronic circuits. It records up to twelve digits of data in two colors at rates up to three lines a second. The basic mechanism is a Burroughs Series J ten-key adding machine from which the manually operated listing keys, functional keys, and intermediate keyboard have been removed. Input code modules, pawl magnets, and stop pawls—one set for each column of digits—replace the listing keys and the intermediate keyboard; printing control circuits replace the functional keys.

Data entry takes place during machine operation instead of before (parallel entry, in contrast with serial entry). During data entry, the Model 1453 generates an inhibit reset signal that can be used to stop the input data from changing.

3.2 CIRCUIT LOGIC

Figure 3-1 is a simplified diagram of the circuit logic. In **STANDBY**, the printer is energized. With the clutch disengaged, the drive motor runs freely. A mechanical lock keeps the stop pawls in the holding position, clear of the type bars.

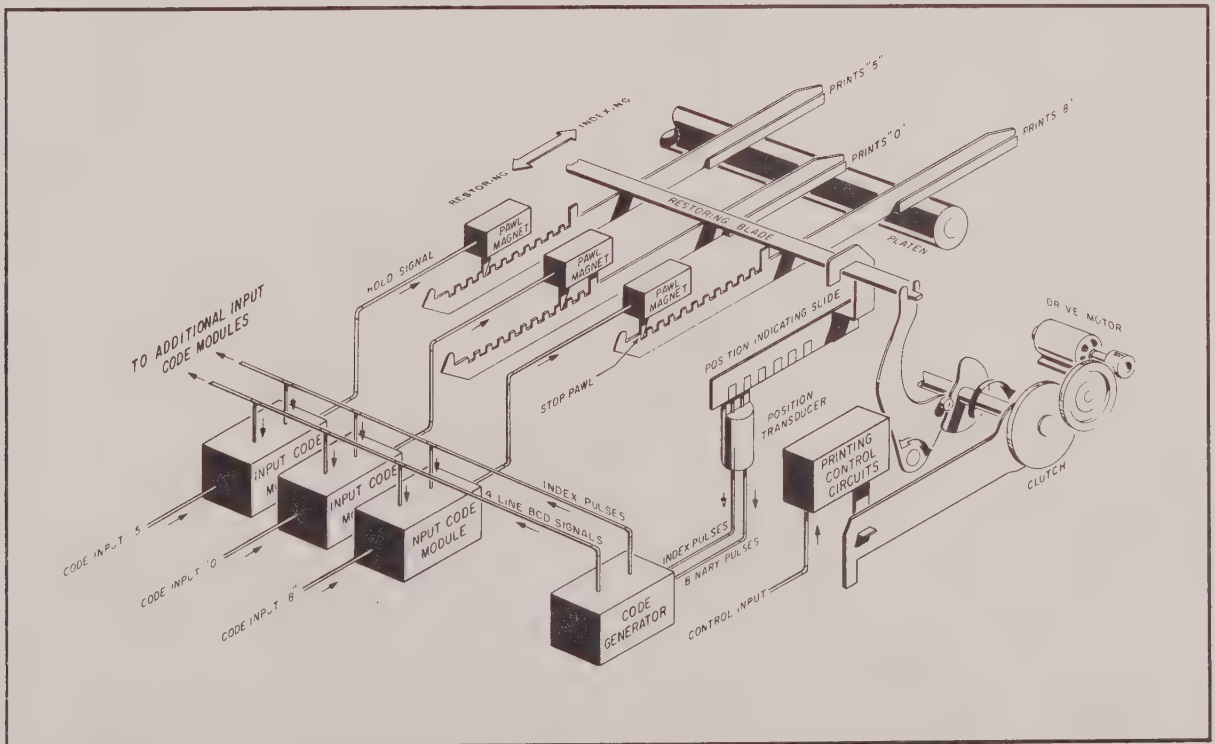


FIG. 3-1. Functional Block Diagram of the Model 1453.

With the STANDBY/PRINT switch at PRINT, the Model 1453 will respond to a print command. When the command arrives, the clutch control circuits engage the clutch, which couples power from the motor through a cam shaft to the printing mechanism.

The excursion control bar starts its indexing movement toward the printing position, followed by the type bars which are held against the control bar by springs. Simultaneously, the lock on the stop pawls is released, leaving the stop pawls held clear of the type bars by a holding current in the pawl magnet coils.

The position indicating slide, which attaches to the excursion control bar, drives the position transducer. The transducer generates indexing and binary pulses representing the decimal position of the type bar assembly. Binary pulses drive the code generator which produces four-line Binary Coded Digit (BCD) signals of 1-2-2-4 or 1-2-4-8 weighting.

Each input code module compares the four-line BCD output of the code generator with the four-line BCD data at its input. When the two data sources coincide, the type bar is in the decimal position corresponding to the input digit. The module responds to the appropriate indexing pulse and cuts off the holding current in the pawl magnet. The stop pawl then drops into a notch on the type bar, stopping the bar in the required position. Typical drop-in time for a pawl is three milliseconds.

If there is no module plugged in for a particular column of digits, or if a column suppression signal is applied, the pawl magnet has no source of holding current. Therefore, the pawl automatically drops into the "no print" notch at the start of the printing cycle, stopping the type bar in a blank position.

When the excursion control bar completes its indexing travel, all type bars have been correctly latched. The platen then rises, pressing the type faces and inked ribbon against a roll of paper to print one line of data. The COLOR lever on the front panel, or a suitable voltage applied to the color control line, will make this impression in either red or black.

After the printing operation, the paper advances one line and the excursion control bar begins its restoring travel, returning the type bars to the starting position and mechanically resetting the pawls. Simultaneously, the position transducer and code generator are reset. Finally, the clutch is mechanically disengaged and the motor then runs freely until the next print command starts a new printing cycle.

3.3 POSITION TRANSDUCER

The position transducer is a mercury-wetted DPST switch, sealed in a capsule that is filled with inert gas under high pressure (see Figure 3-2). Since mercury ensures bounce-free contact, the transducer drives the electronic circuits directly.

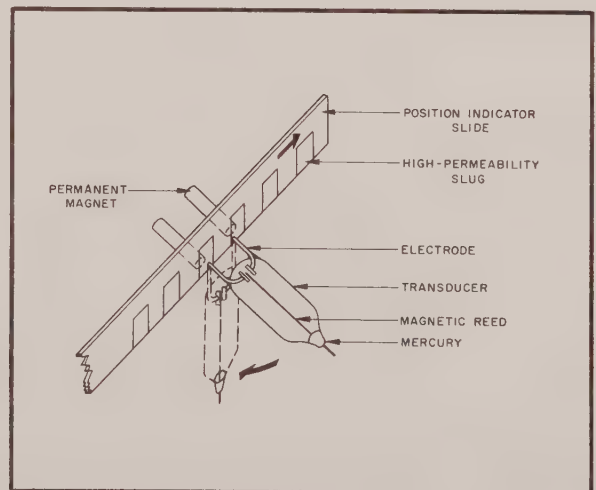


FIG. 3-2. Position Transducer.

Two permanent magnets, one opposite each electrode, establish a symmetrical field near the electrodes. Moving with the excursion control bar, the position indicating slide places magnetic slugs between the magnets and the electrodes. This distorts the field and attracts the magnetic reed in the transducer to the nearest slug. The spacing of the magnets and slugs is such that the reed switches from one electrode to the other for each decimal position of the type bars, generating the first place of a four-line BCD position code. Simultaneously, signals from one electrode trigger the code generator, which provides the other three places of the four-line BCD position code.

3.4 CODE GENERATOR

3.4.1 Design of the Code Generator

A position transducer and three binary, or flip-flop, stages (Q101-Q102, Q103-Q104, and Q105-Q106) comprise the code generator, which produces four-line BCD signals representing the decimal position of the type bar assembly.

Figures 3-3 and 3-4 illustrate code generator logic and output wave shapes, respectively. Diode gate CR113 and a feedback circuit convert the three binaries into a decimal counting circuit. Diodes CR110 and CR111 determine the weighting of the four-line code. With the code control

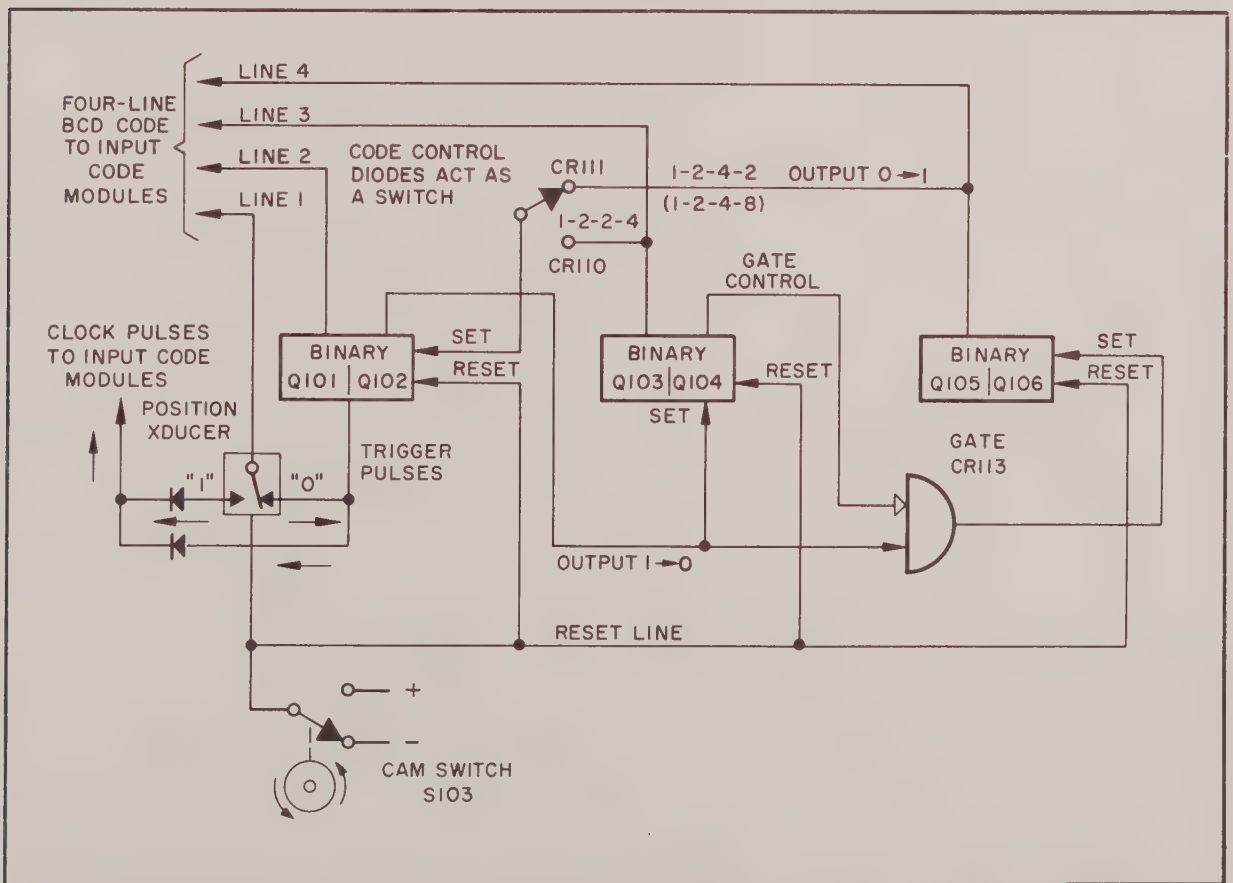


FIG. 3-3. Code Generator.

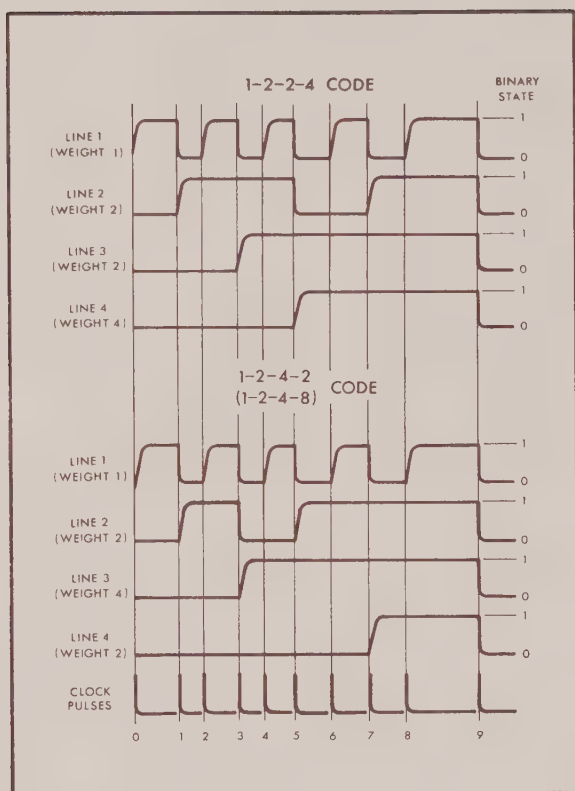


FIG. 3-4. BCD outputs of the Code Generator.

line ungrounded, CR111 switches the loop from Q105 to Q102, changing the weighting to 1-2-4-2, for either 1-2-4-2 or 1-2-4-8 input code (both weights are the same in the Model 1453 logic).

3.4.2 The Binary Circuit

A typical binary stage in the code generator consists of a pair of P-N-P transistor amplifiers with the collectors and bases cross-coupled. Being symmetrical, the circuit can exist in either of two stable states (one transistor on, the other off, or vice versa). Figure 3-5 shows one binary and explains how positive pulses from the position transducer switch the circuit from one stable state to the other.

3.5 INPUT CODE MODULE

3.5.1 General Design Features

Two kinds of input code modules are available for the Model 1453: a four-line module for BCD data of 1-2-2-4, 1-2-4-2, and 1-2-4-8 weighting, and a ten-line module which accepts both ten-line and four-line data. Both 1-2-4-2 and 1-2-4-8 code weights are the same for the Model 1453. Each module plugs into any of twelve sockets, numbered 1 through 12, which correspond to the positions of the digit columns. A maximum of twelve digits of coded data can be plugged into the modules in any order. By connecting the individually numbered connectors on the input cable to a particular module, the digits can be arranged in any order on the printed line.

3.5.2 Four-Line Input Code Module

The input code module is a solid-state device comprising a coincidence comparator (CR201-CR208), a two-stage trigger circuit (Q201, Q203), and a pawl magnet driver (Q202). See Fig. 3-6.

Clock pulses generated for each position of the type bar assembly are applied to the trigger circuit through an attenuator. The attenuation factor is high when any coincidence diode (CR201, CR203, CR206, or CR208) is conducting, and low when all four diodes are non-conducting. Four lines of BCD data are applied to the anodes of the diodes from the external input source; four lines of similarly coded data are applied to the cathodes from the code generator. As long as the decimal digits represented by the two data sources are different, at least one of the diodes will conduct. Therefore, the clock pulses are attenuated to about +5 volts—too low to affect the trigger circuit. During this quiescent condition, the trigger is in RESET, keeping Q202 on. Since the collector of Q202 is returned to

-14 volts through the pawl magnet, the magnet is energized and the stop pawl is held clear of the type bar.

When input data and position data coincide, all four diodes are non-conducting. A clock pulse arriving at coincidence has enough amplitude to switch the trigger circuit to its other stable state, turning off Q202 and allowing the stop pawl to drop. During the restoring part of the printing cycle, a contact closure in the cam switch resets the trigger, turning Q202 on and restoring the holding current in the pawl magnet.

Each input module supplies holding current to its corresponding pawl magnet. Removing the module de-energizes the magnet. Therefore, when the mechanical lock on the magnet armature releases at the beginning of a printing cycle, the stop pawl of any de-energized magnet drops, latching its type bar in the "no print" position. This column suppression feature automatically ensures that no data will be recorded in any digit column that does not have an input module. Column suppression can also be controlled remotely by a contact closure to power ground from one pin on the top connector of any module.

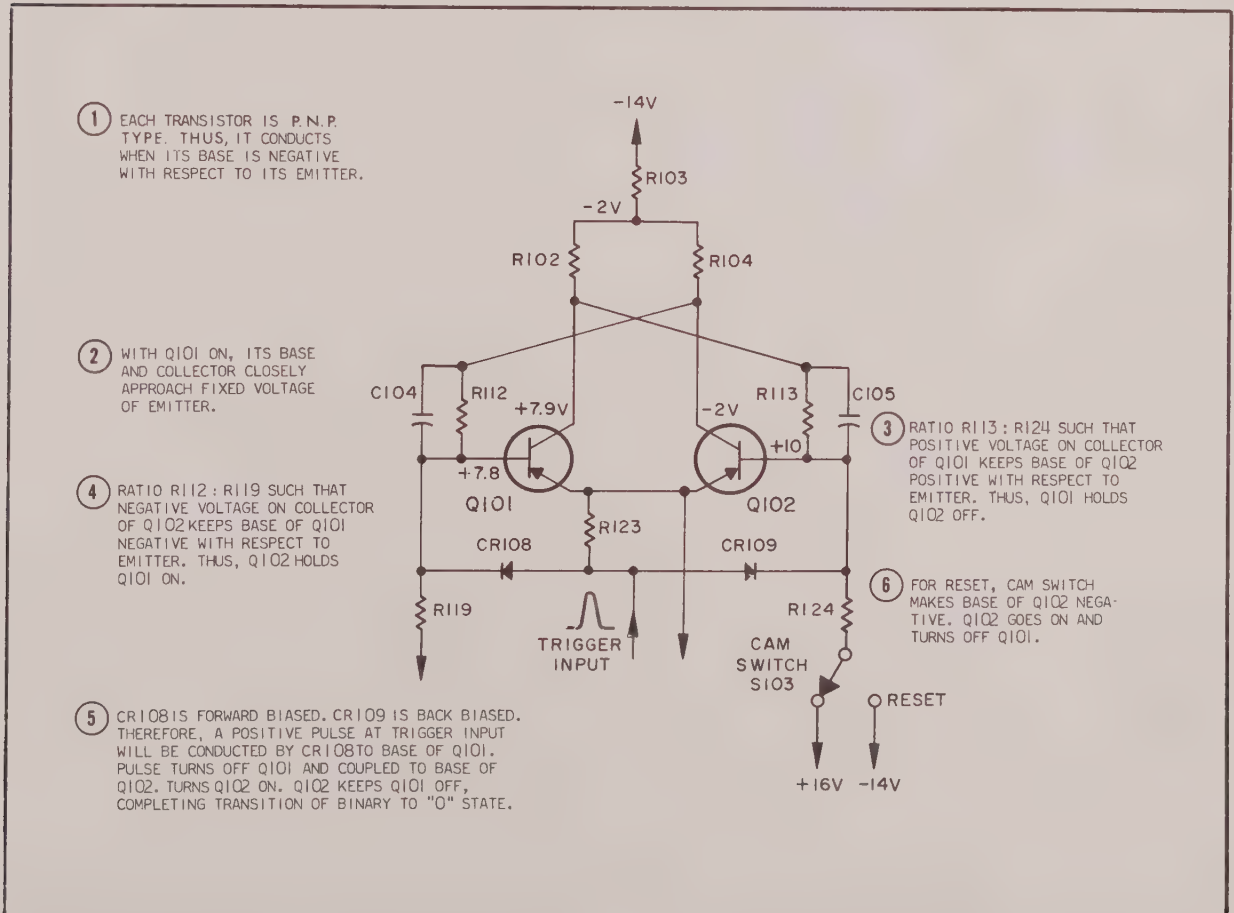


FIG. 3-5. A typical binary in the Code Generator. Circuit is shown in the "1" state.

Grounding this pin turns Q202 off, allowing the stop pawl to drop when the reset signal is removed at the beginning of the cycle.

3.5.3 Ten-Line Input Code Module

The ten-line input code module uses a diode matrix which first translates the decimal input data into four-line BCD data, weighted 1-2-2-4 or 1-2-4-8 according to the position of a switch on the module. The remaining circuit is the same as that of the four-line module.

Since the ten-line module accepts both ten-line data and BCD data, a printer fitted with these modules is able to record both types of information on one line.

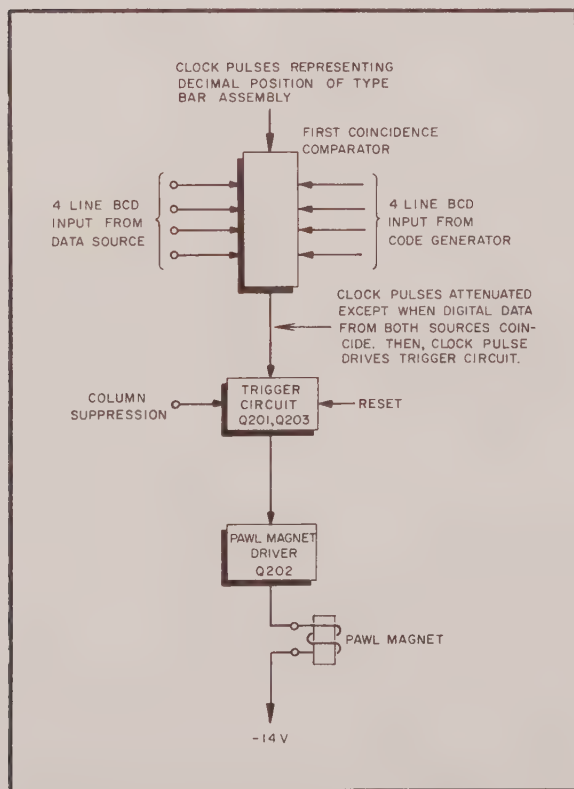


FIG. 3-6. Logic diagram of the four-line input code module.

3.6 CONTROL CIRCUIT

3.6.1 Design of the Control Circuit

The control circuit responds to the print and color control commands to select the color of the impression and start the printing cycle. Both commands are applied to a control trigger circuit (V101, Q107) which drives a clutch actuating circuit (Q108, K103) and a color selector (K102). Interference between clutch control and color control is avoided by the timing sequence of the two functions, as described in paragraph 3.6.3.

3.6.2 Control Trigger Circuit

The control trigger circuit comprises a cathode follower (V101A) and a trigger stage (V101B, Q107). (See Figures 3-7 and 3-8.) This circuit serves two purposes. First, it presents a high input impedance to the external control signals (print command and color control command) and a low output impedance to the printer's solid-state circuits. Next, it responds only when the voltage on the print command line drops below a set triggering level (about -8 volts) for a period long enough to operate the clutch actuator.

3.6.3 Control Logic

Steps 1 through 12 of the following paragraphs outline a complete cycle of printer operation. These steps are related to the circled numbers in Figure 3-9, to each mechanical drawing (Figures 3-10 through 3-30), and to the Timing Diagram on page 5-4a.

STEPS FOR COMPLETE CYCLE OF PRINTER OPERATION

- ① In READY state, i.e., before a print command, clutch actuator K103 is de-energized. The motor is running with clutch disengaged. Printer mechanism is at rest.

- ② A print command passes through contact A of K103 to control trigger, which generates a 28 volt positive output step.
- ③ Transformer T102 differentiates 28 volt step, producing a positive pulse at end A and a negative pulse at end B.
- ④ With print switch S102 at PRINT, diode CR117 conducts, returning base of Q108 to ground through contact C of K103. Q108 turns on. Collector current then flows, energizing K103. When armature of K103 moves, it releases a mechanical trip that engages the clutch. The cam shaft then begins to rotate.
- ⑤ Contact D of K103 closes. K103 is then latched through resistor R149. (K103 is now independent of Q108.)
- ⑥ As armature of K103 continues its travel, contact C breaks ground return to base of Q108, turning off Q108. Subsequent operation of control trigger circuit during color control sequence will not affect clutch control circuit.
- ⑦ Contact B of K103 closes, grounding inhibit reset line. This inhibit reset command prevents reset of data source before data entry is complete.
- ⑧ Contact A of K103 opens, disconnecting print command line from control trigger circuit. Trigger circuit is then available for color control function.
- ⑨ The color printed is determined by amount of travel of ribbon shift mechanism, which moves either the red or black portion of ribbon into a position between type face and paper for printing operation. To print red, ribbon guides are permitted full travel. To print black, movement is restricted by linkages operated manually from front-panel RED/BLACK lever, or electrically by color selector K102.

To select color electrically, set front-panel lever at RED. Then, with binary 1 (0 to +50 volts) on color control line, output of control trigger circuit should be -28 volts (see

Figure 3-8). Thus, K102 de-energizes and red will be printed. With binary 0 (-12 to -50 volts) on color control line, K102 energizes and black is printed.

NOTE

Relay K102, energized by initial print command, remains energized after contact A of K103 opens (step 8). K102 remains energized because control trigger input is held negative via R150 which connects to -14 volts through contact A of cam switch S103. After cam shaft rotation opens S103A, control trigger input voltage rises because R150 connects to +16 volts through R121. At that time, K102 de-energizes unless a "print black" signal is present on the color control line.

- ⑩ When data entry is complete—about halfway through the mechanical cycle—S103A closes again, but the change from ground to negative at control trigger input does not affect the clutch actuator, since contact C of K103 is still open (see step 3).
 - ⑪ Aligner arm locks type bars in their selected positions, at same time pressing armature of K103 into de-energized position, unlatching K103. The control circuit is then able to again accept a print command, and the external source is free to provide new data. However, the clutch remains engaged until the end of the cycle, at which time data printing is complete and type bars have been restored to their starting position.
- Since the input to the control trigger circuit is already held negative through R150 and S103A, closing K103A cannot produce a false print command. The input needs to reach ground level or above and then drop below triggering level before clutch control circuit responds.
- ⑫ If a new print command arrives before the cycle is complete, the mechanism does not stop at end of cycle. Instead, command will trigger clutch actuator so that clutch remains engaged.

- Theory of Operation -

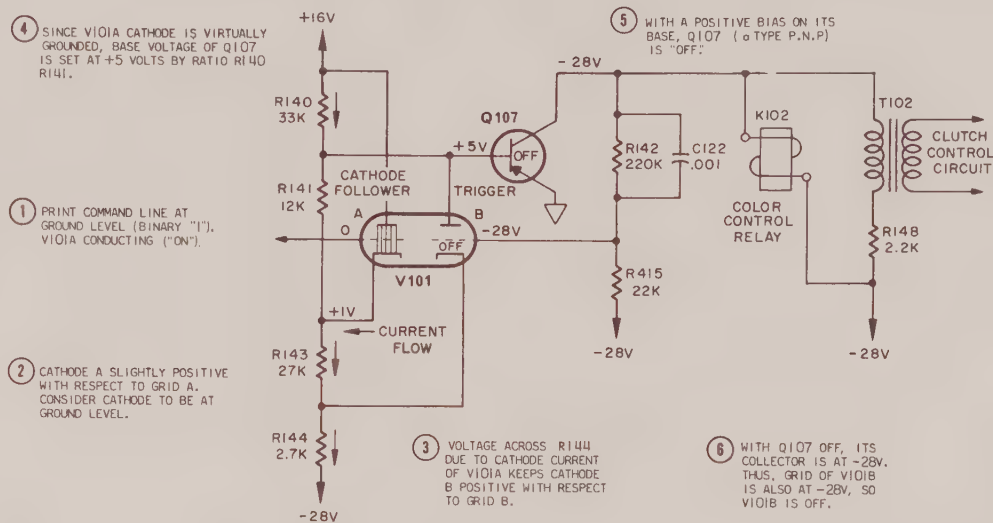


FIG. 3-7. Quiescent (Reset) state of the control trigger circuit.

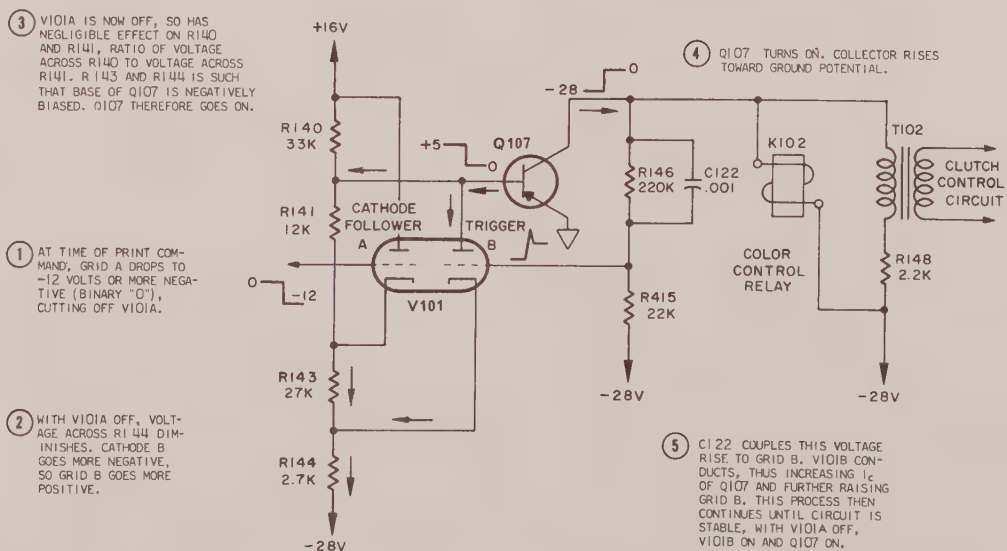


FIG. 3-8. Response of control trigger circuit to a command.

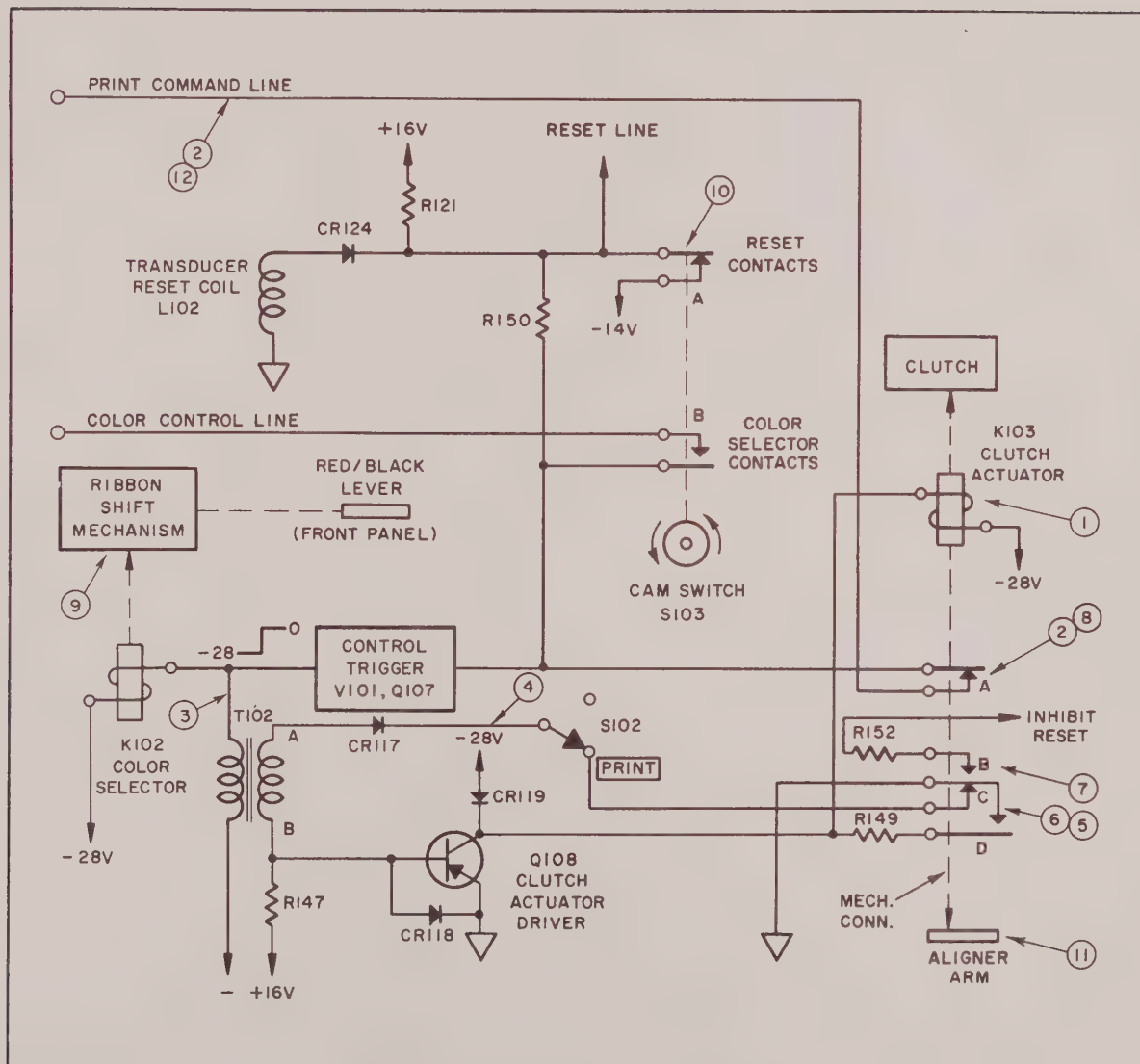


FIG. 3-9. Control circuit, simplified.

FIG. 3-10.
CLUTCH (IDLE)

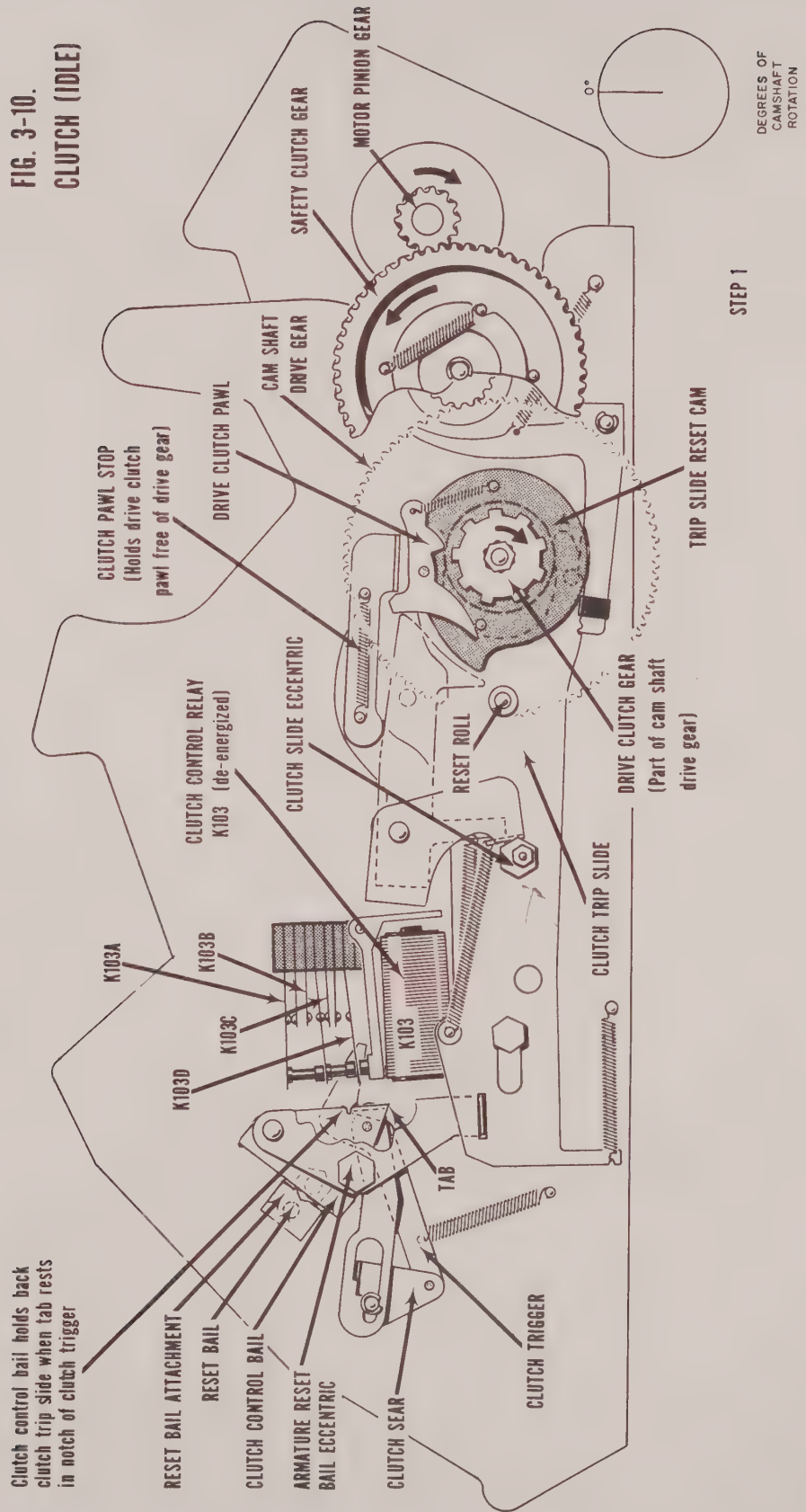
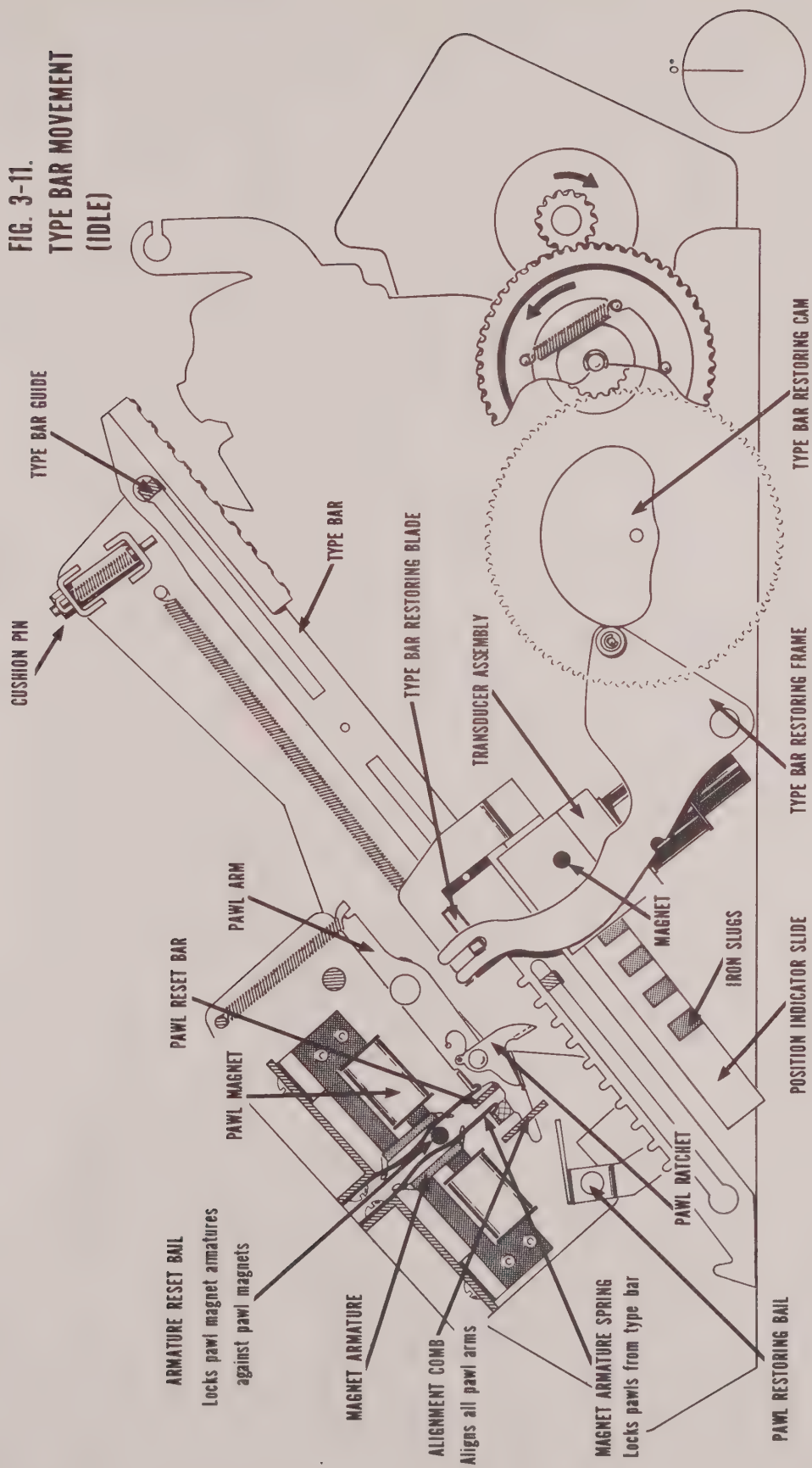


FIG. 3-11.
TYPE BAR MOVEMENT
(IDLE)



STEP 1

FIG. 3-12.
CLUTCH (ENGAGED)

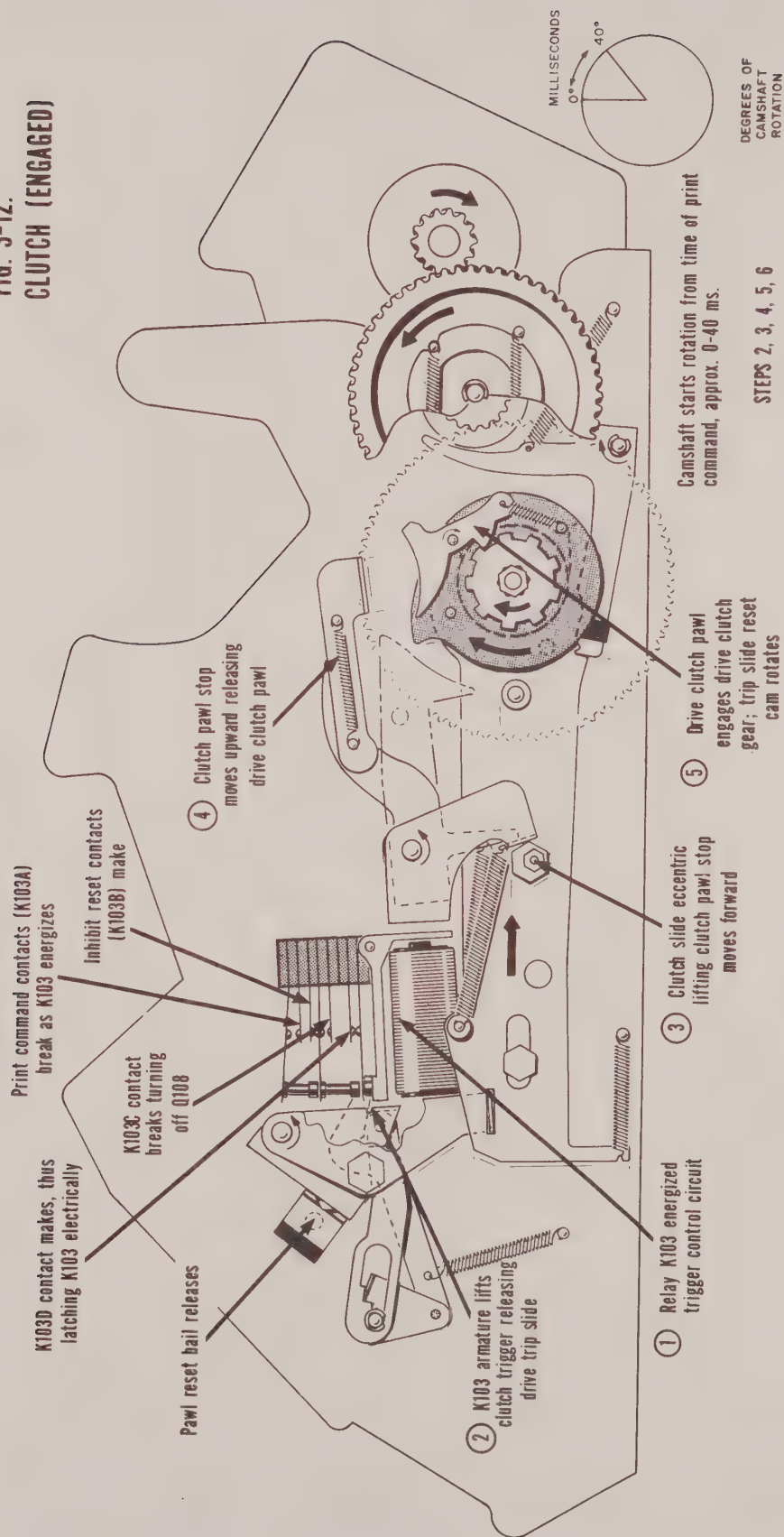


FIG. 3-13

TYPE BAR MOVEMENT (INDEXING) AND PAWL RELEASE

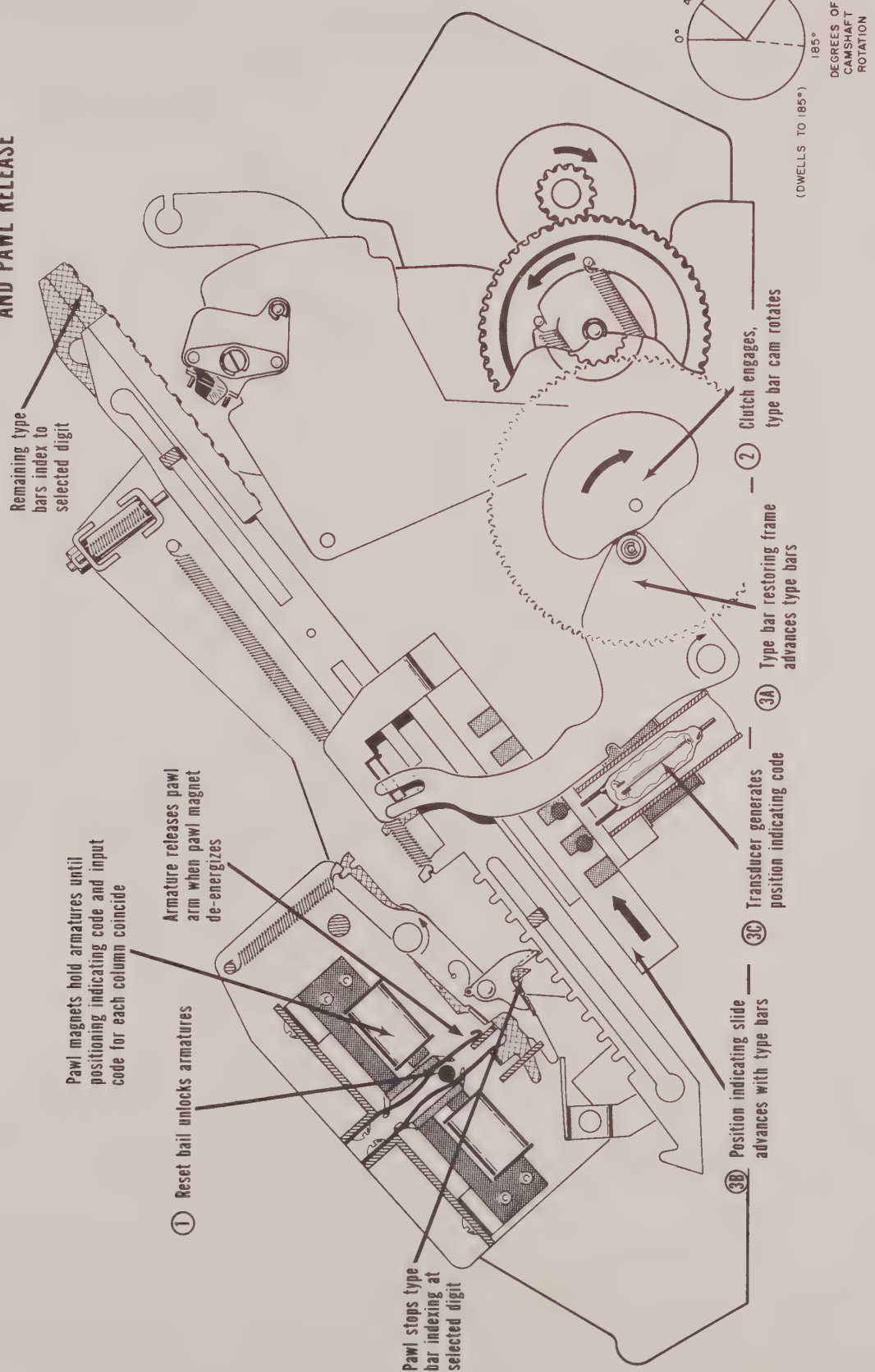


FIG. 3-14.

TYPE BAR ALIGNMENT

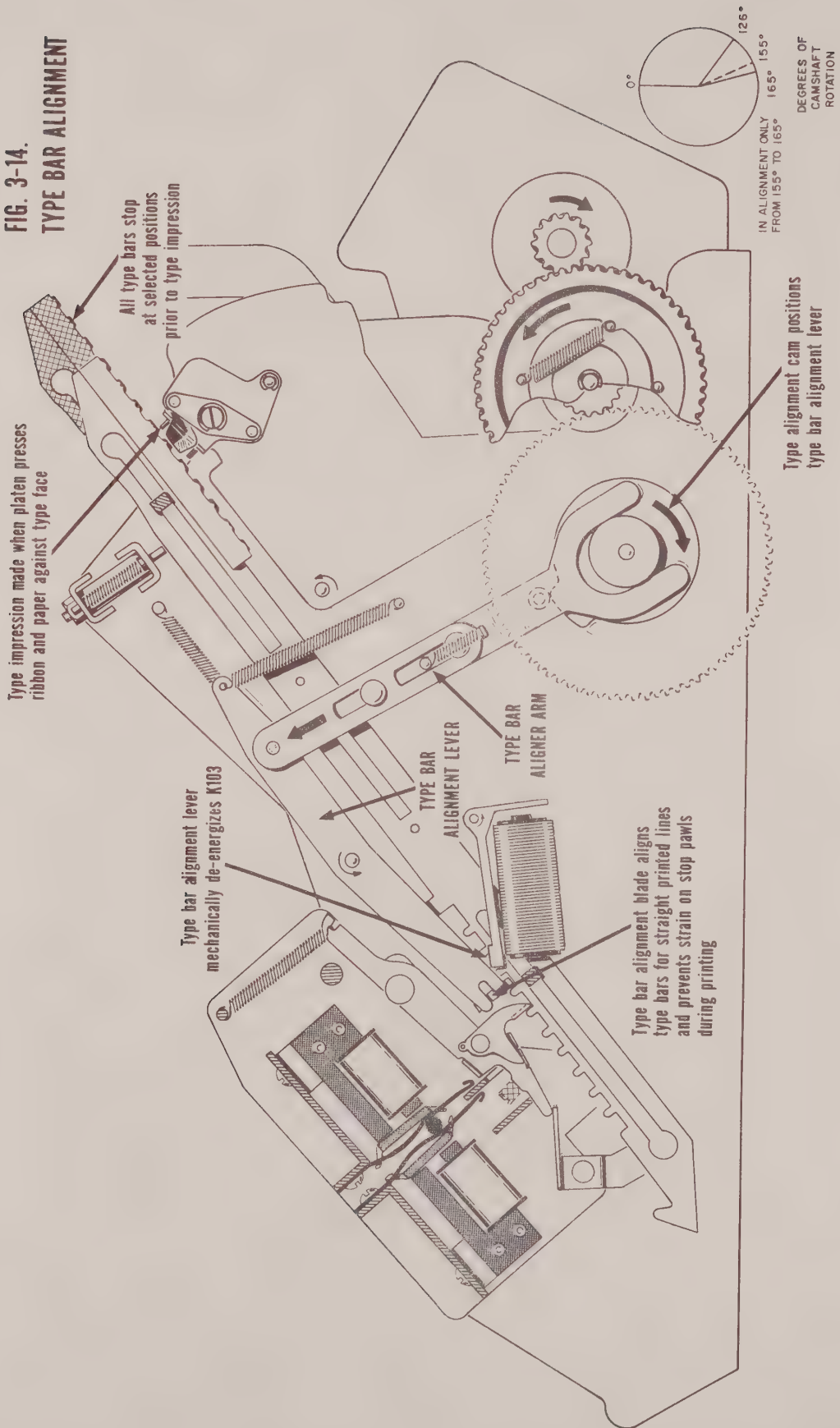


FIG. 3-15.
RIBBON POSITIONING
(IDLE)

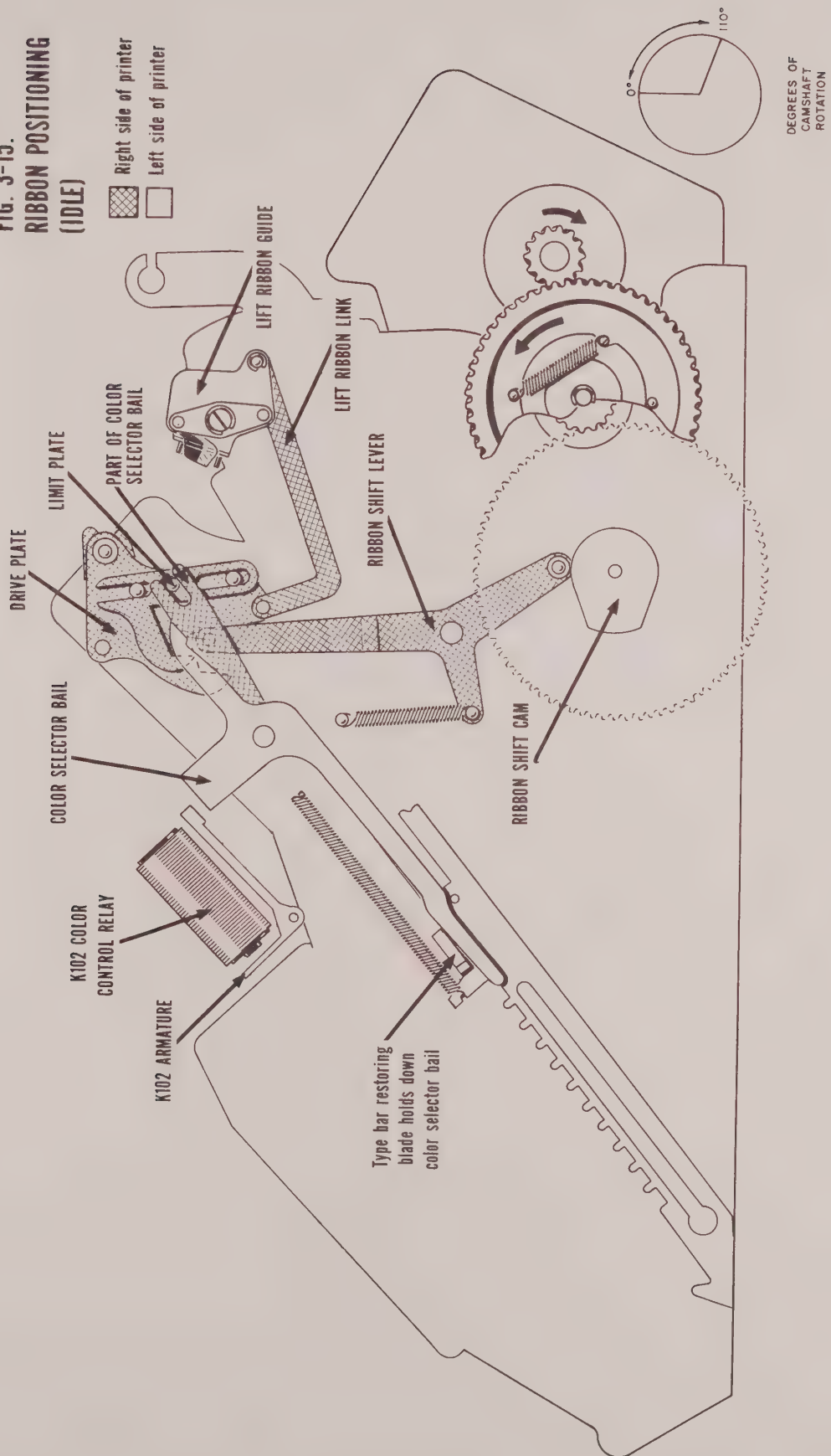


FIG. 3-16.
RIBBON POSITIONING
(RED)

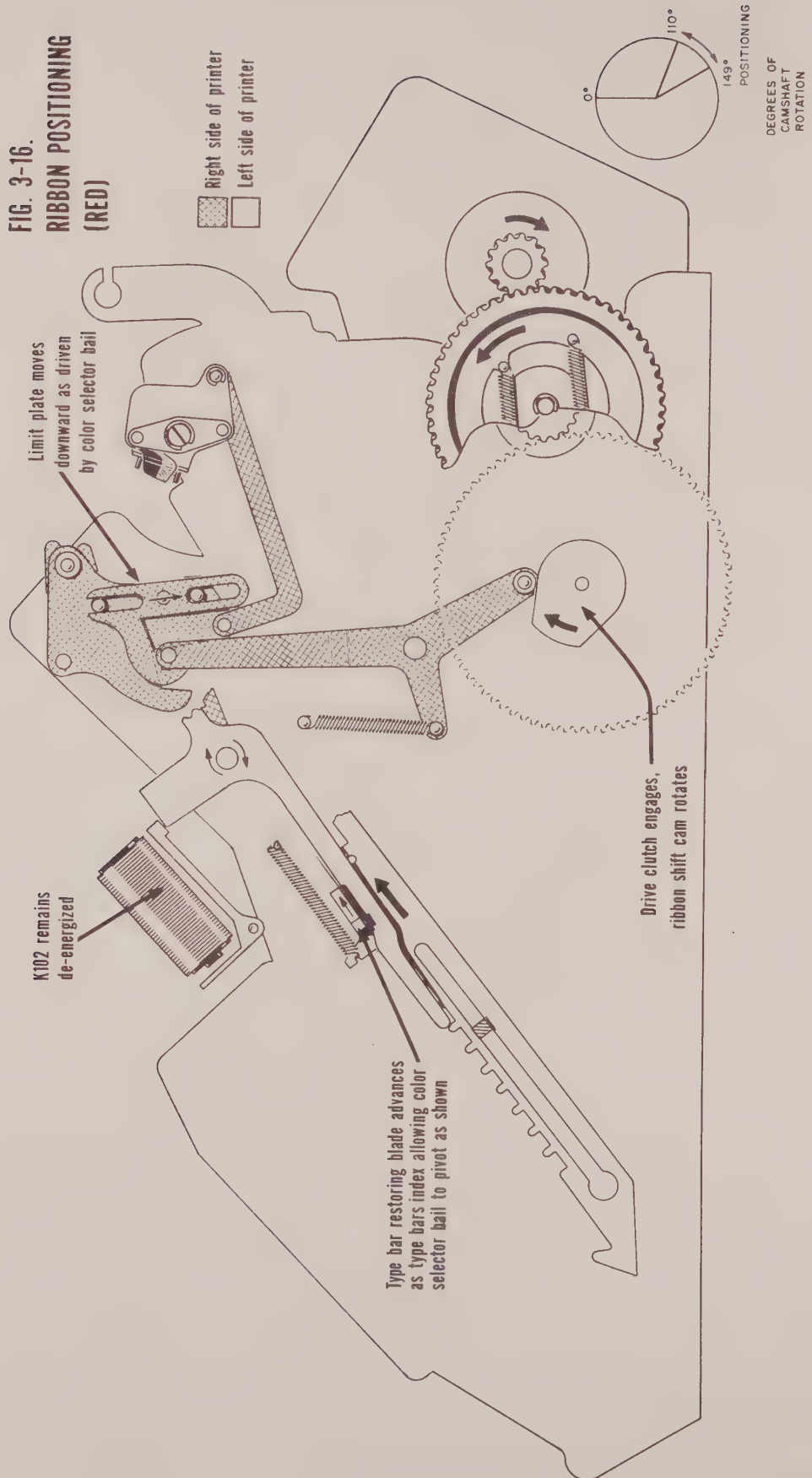


FIG. 3-17.
PRINT (RED)

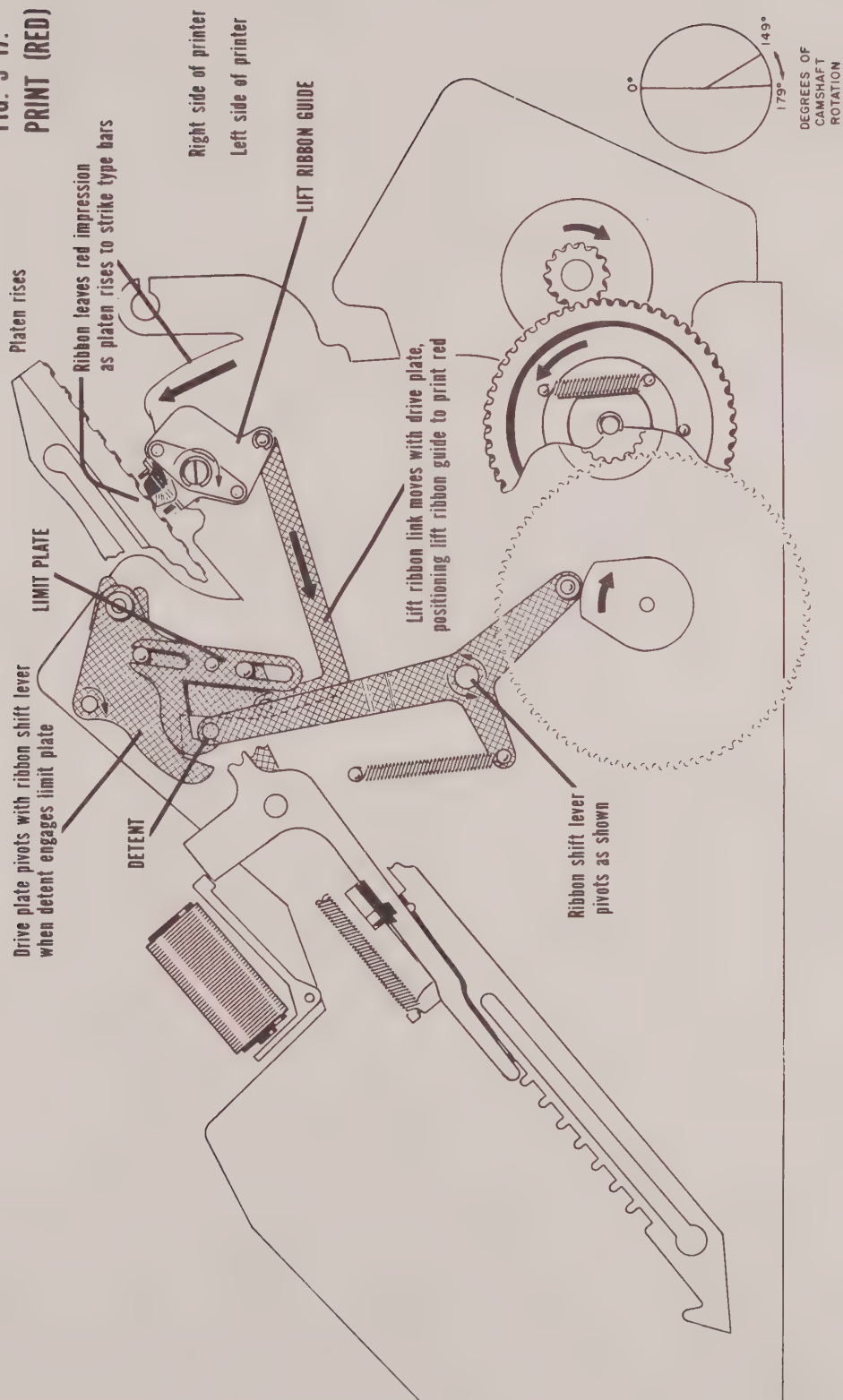


FIG. 3-18.
RIBBON POSITIONING
(BLACK)

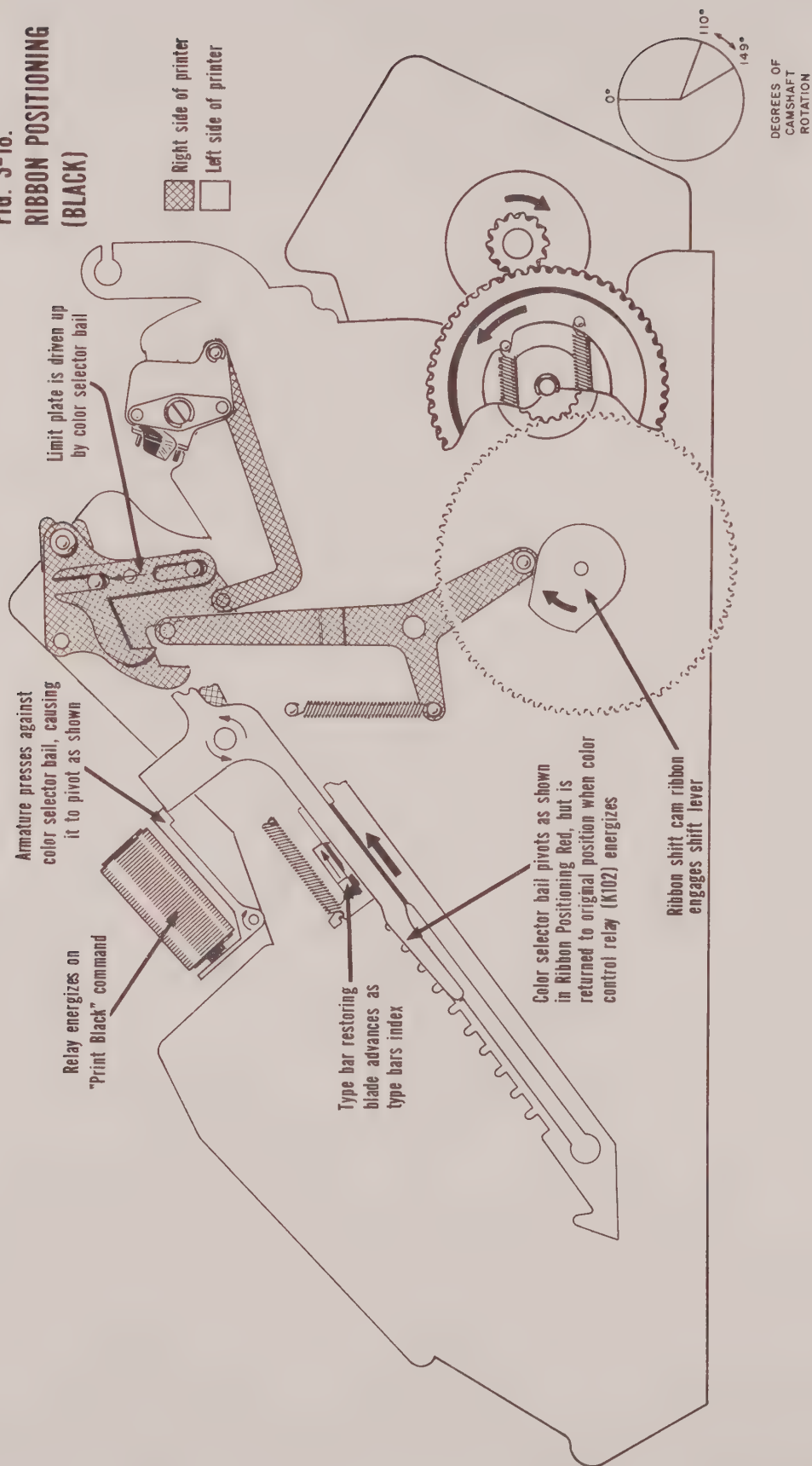


FIG. 3-19.
PRINT (BLACK)

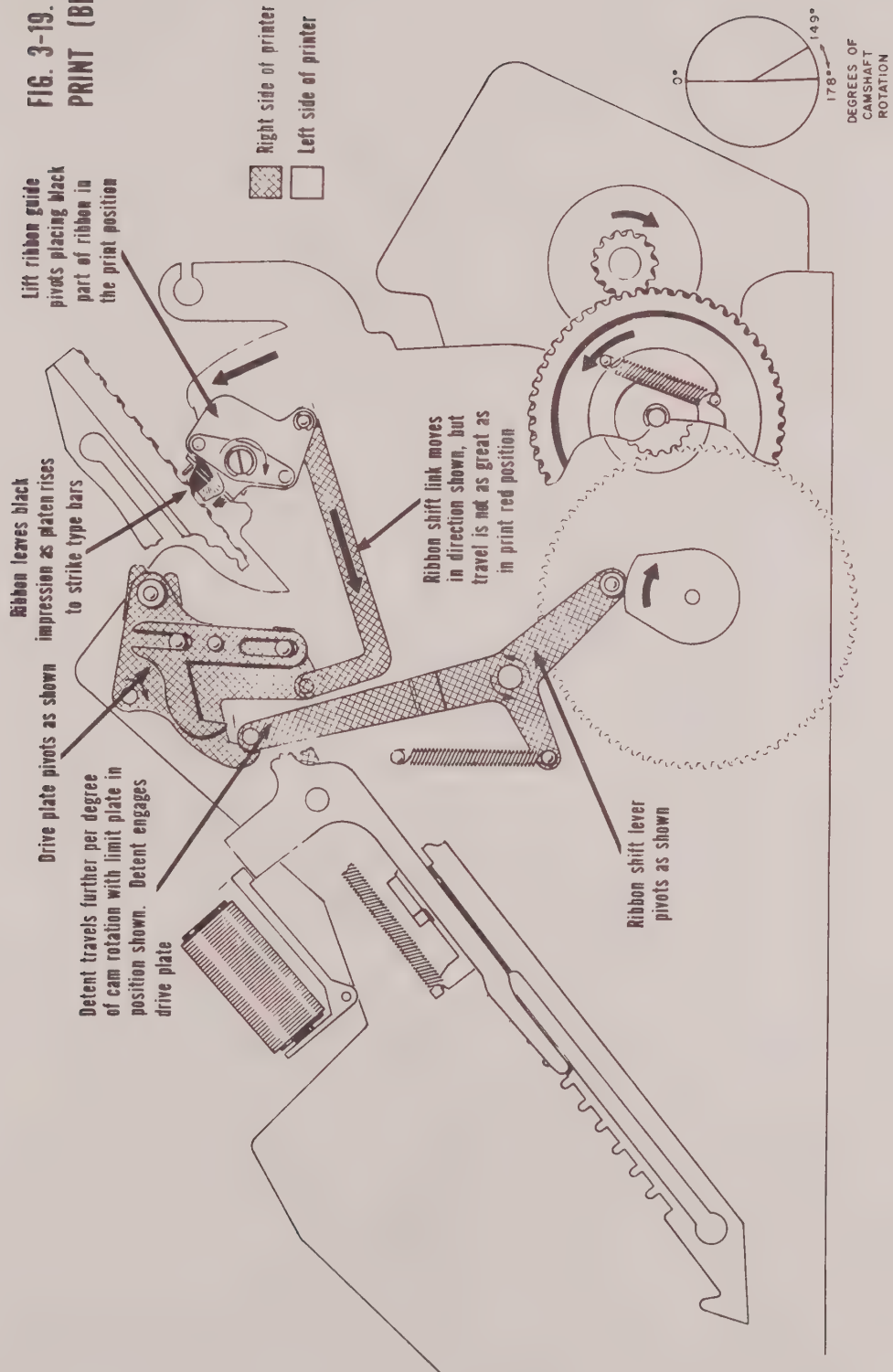


FIG. 3-20.
TYPE BAR MOVEMENT
(RESTORING)

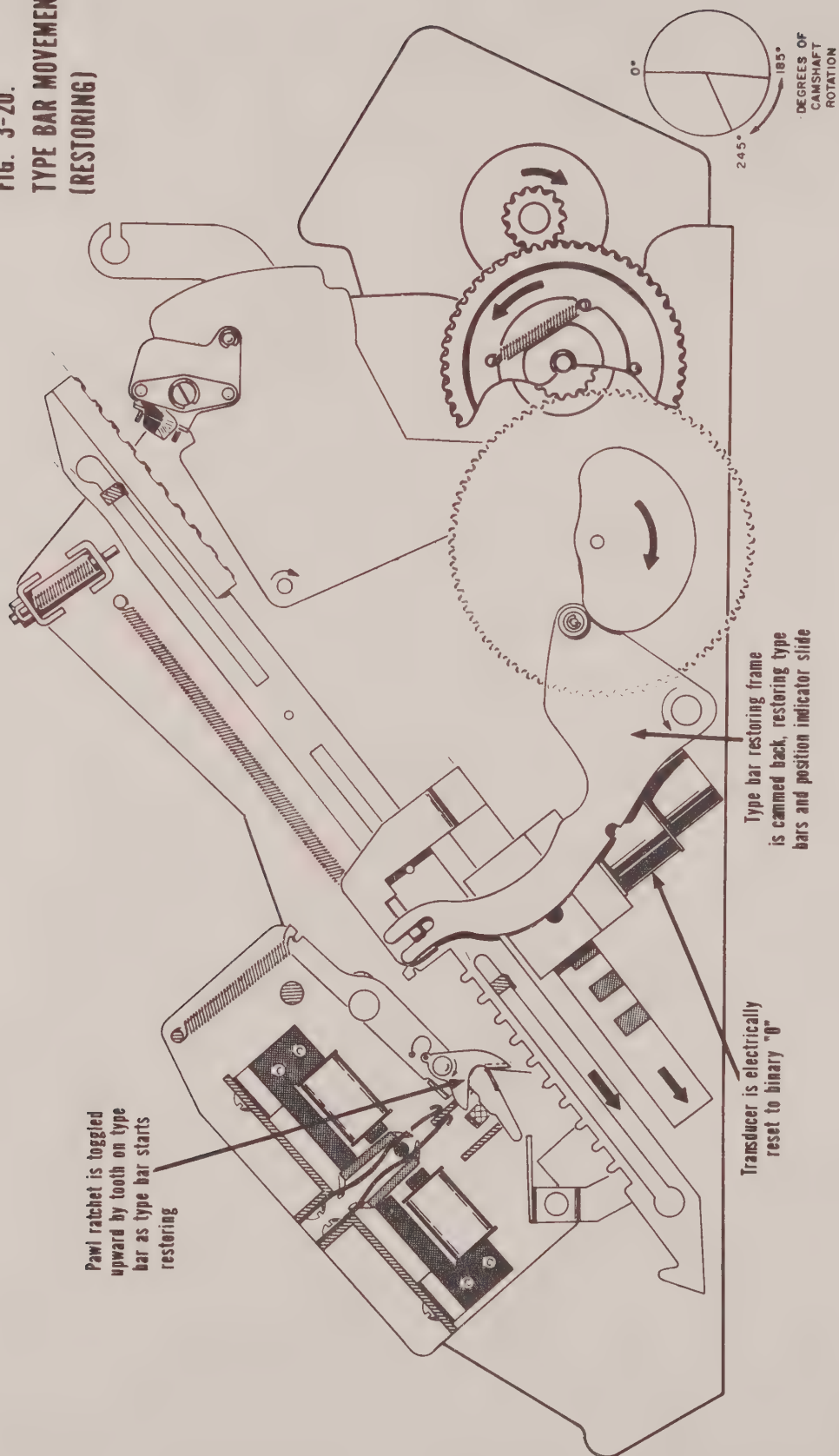


FIG. 3-21.
PAWL RESTORING

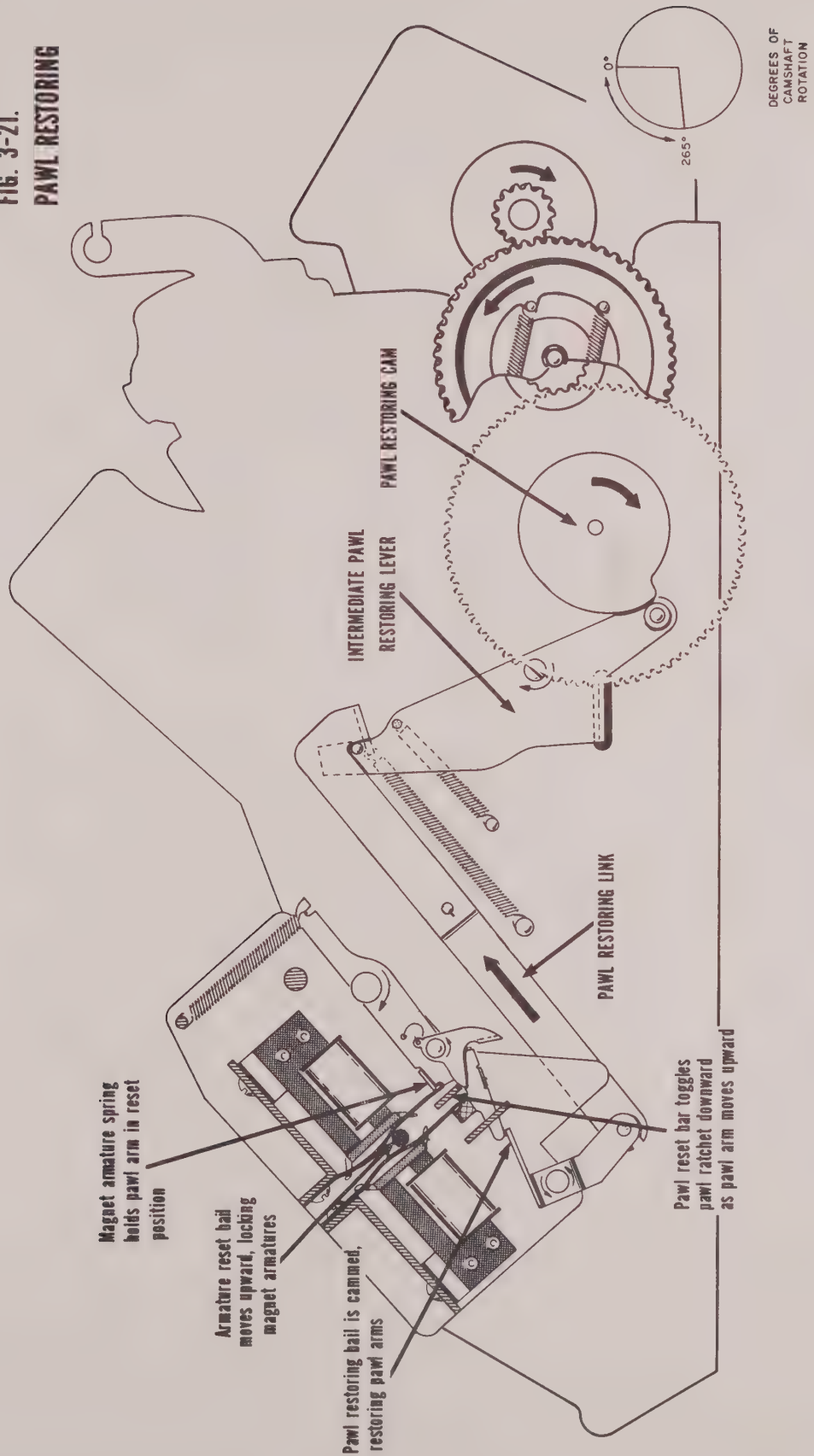


FIG. 3-22.
CLUTCH DISENGAGING

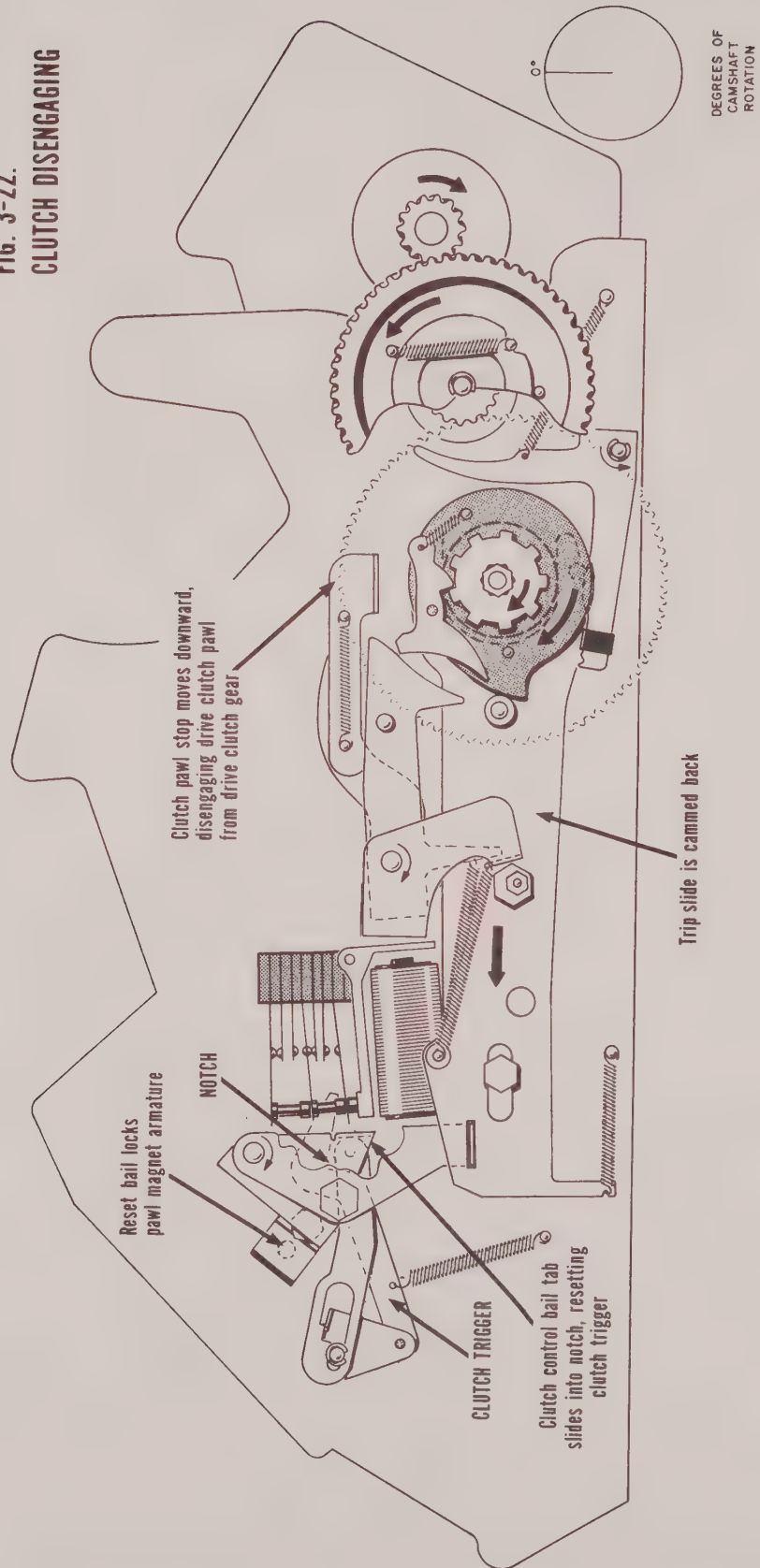
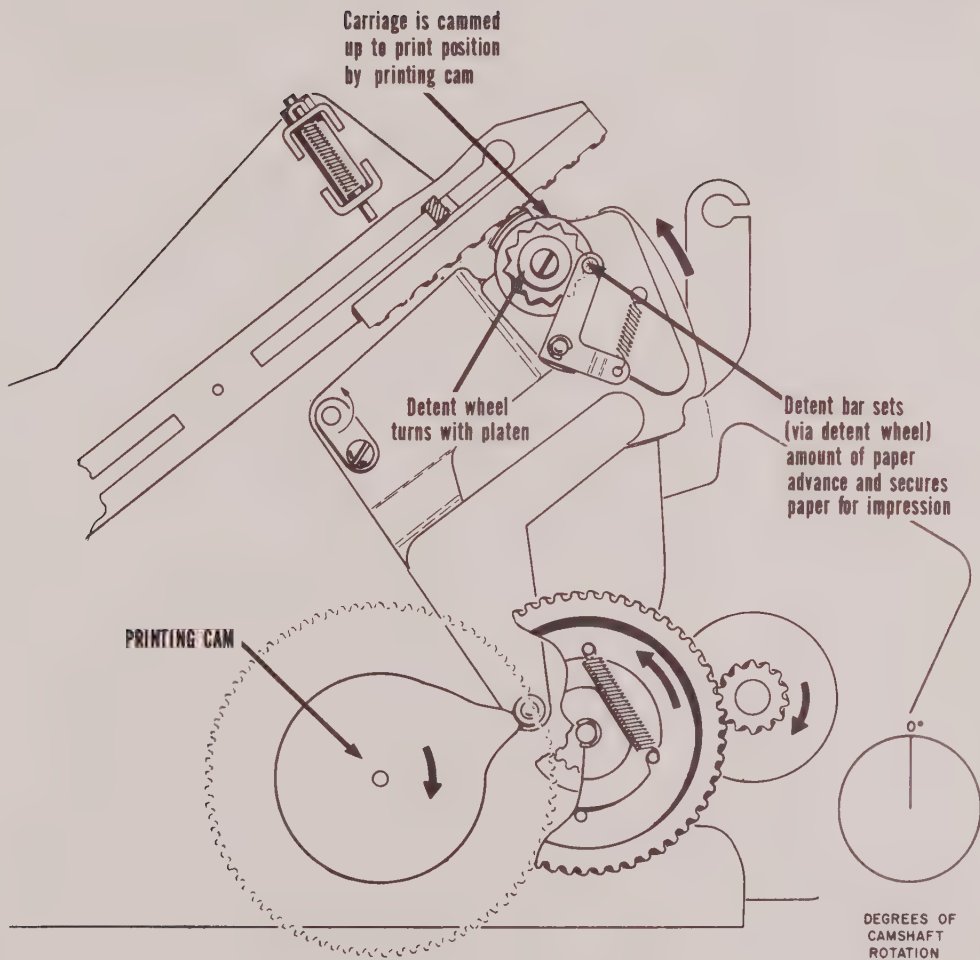


FIG. 3-23.
PAPER ADVANCE
(Platen Positioning Upward)



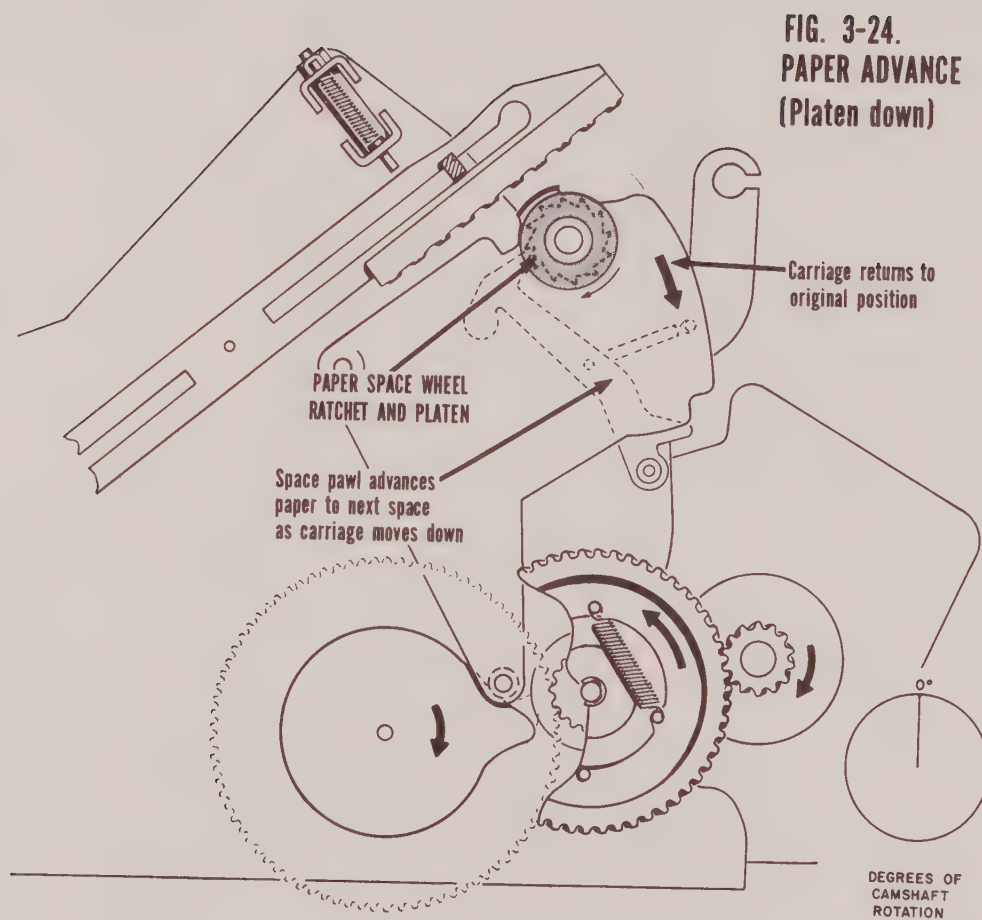


FIG. 3-25.
RIBBON FEED, IDLE
(Left Side Feed)

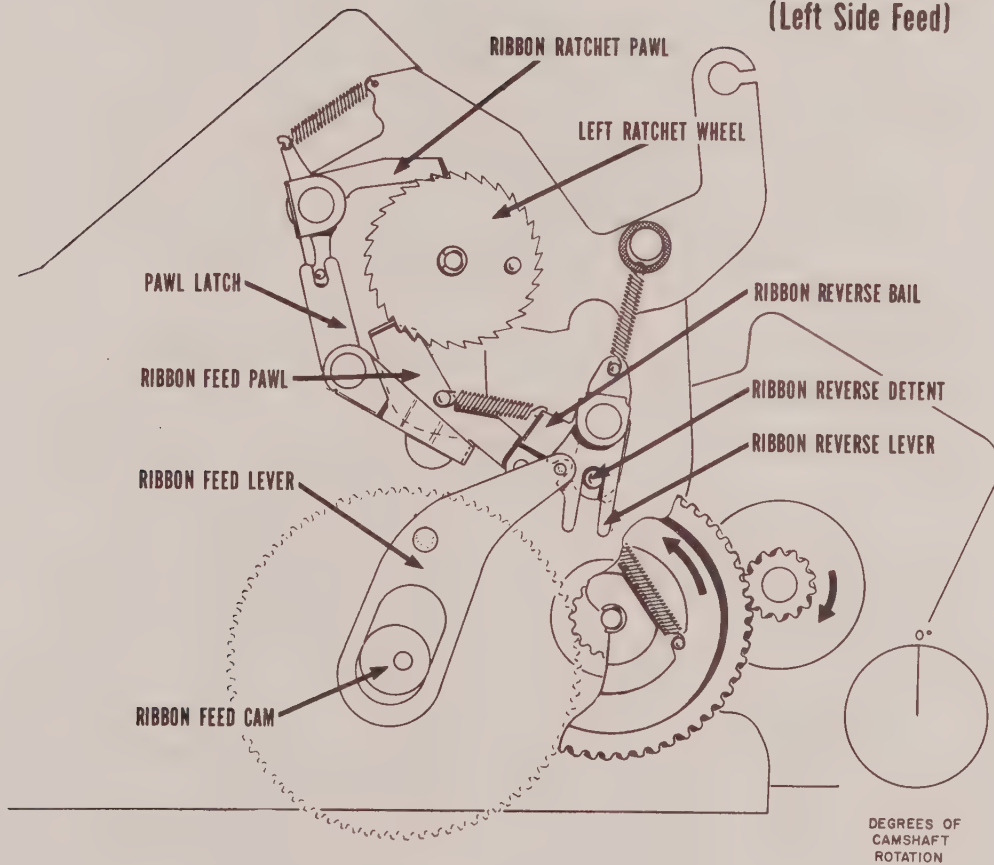


FIG. 3-26.
RIBBON FEED, LEFT SIDE
(Right to Left Side Feed)

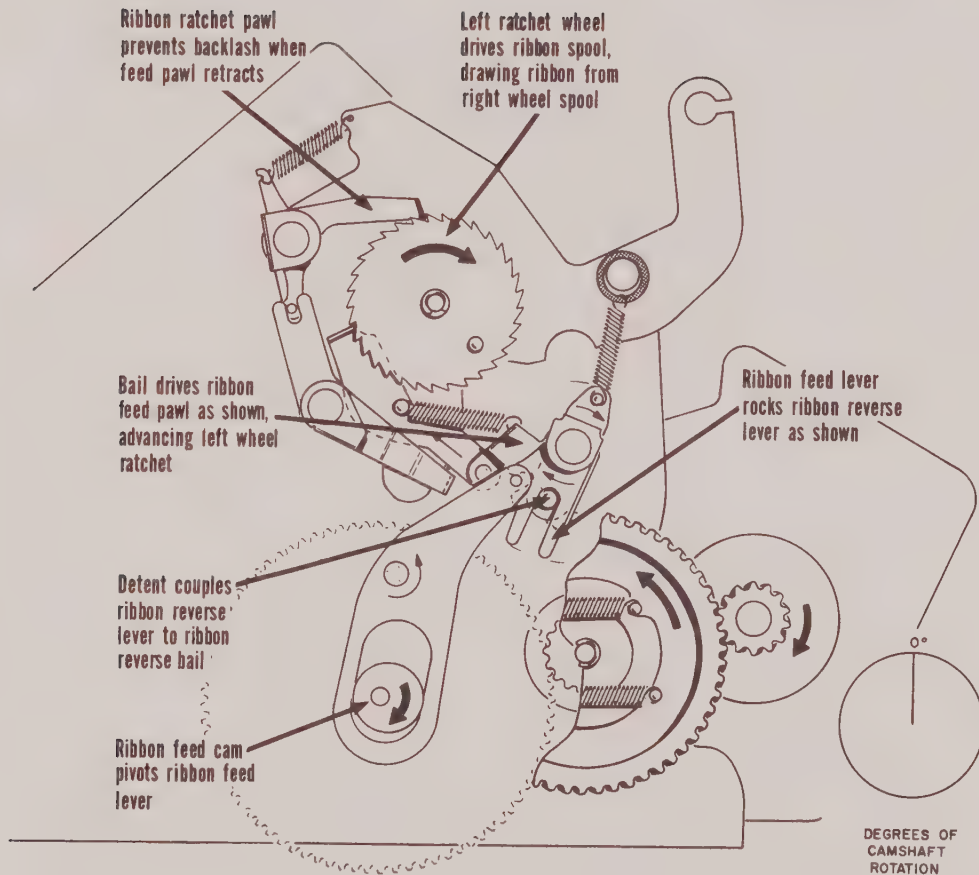


FIG. 3-27.
RIBBON REVERSE

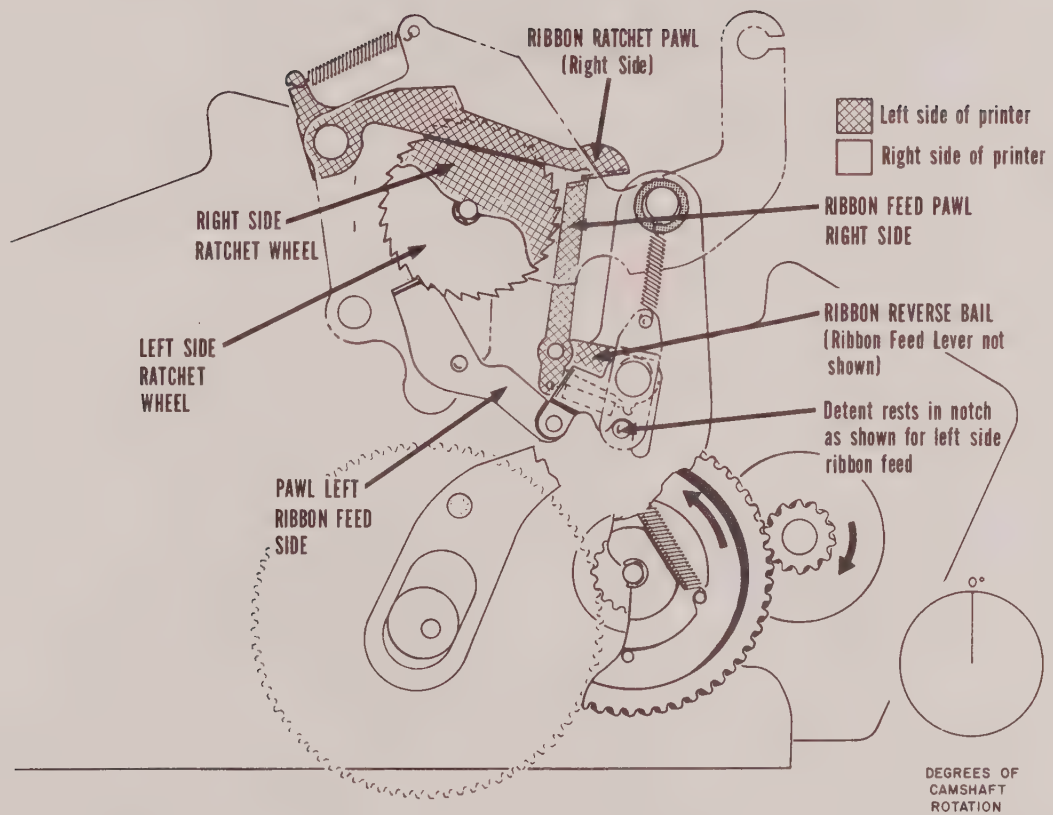


FIG. 3-28.
RIBBON REVERSE
(From Right Feed
to Left Feed)

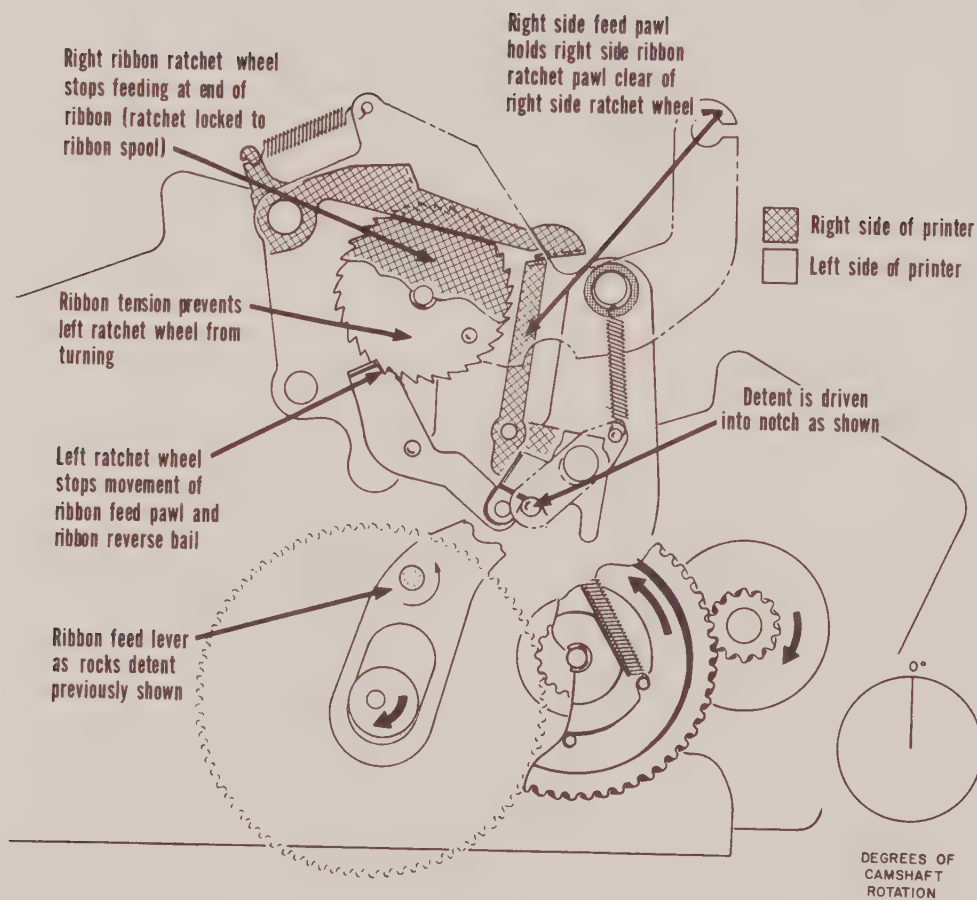


FIG. 3-29.
RIBBON FEED
(Left to Right Feed)

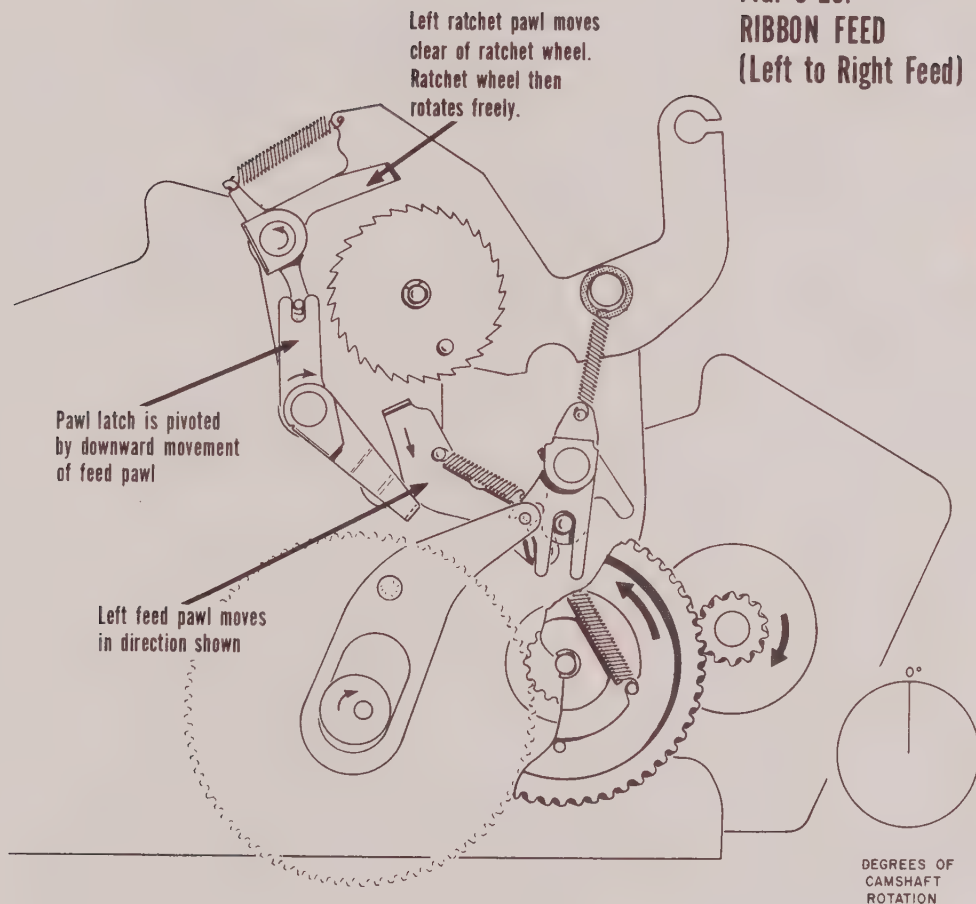
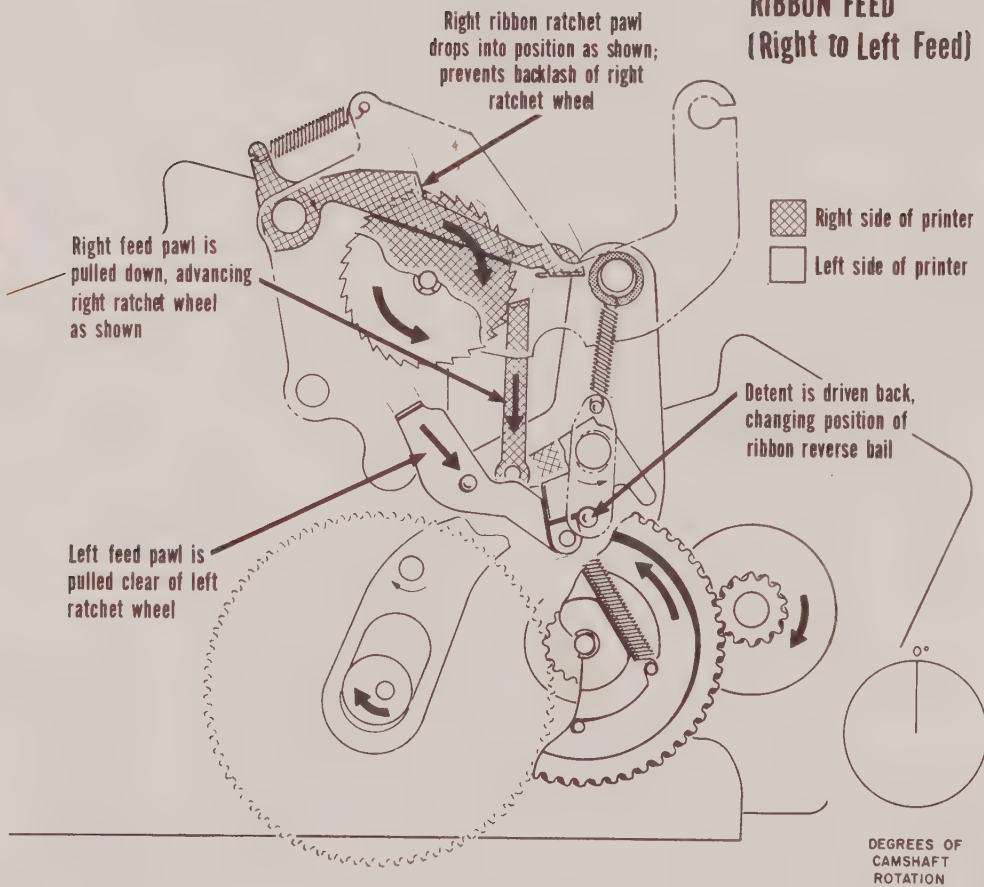


FIG. 3-30.
RIBBON FEED
(Right to Left Feed)



SECTION 4

SERVICING

4.1 PREPARING PRINTER FOR SERVICING

4.1.1 Removing Printer from Case

To remove the portable case, pull out the catch on each side of the case, near the bottom, then slide the case back and up.

To remove the printer from its rack adapter or bench cabinet, give a quarter turn counterclockwise to the two screws below the paper compartment; then slide the printer forward.

4.1.2 Removing Printer Mechanism

For most of the mechanical servicing procedures described in this section, you will need to remove the printer mechanism, as shown in Figure 4-1.

4.1.3 Manual Operation of Printer Mechanism

When servicing the printer, it is often necessary to cycle the mechanism by hand, as follows:

- 1) After removing the mechanism (Figure 4-1), turn the left side of the printer toward you. Between the side plate and the pawl magnet assembly you will find the mechanical trigger shown in Figure 4-2.
- 2) Press upward the lever indicated in Figure 4-2. The clutch will then engage.
- 3) Drive the mechanism through one cycle by rotating the large nylon gear in the gear train counterclockwise (the gear engages with the drive motor pinion).

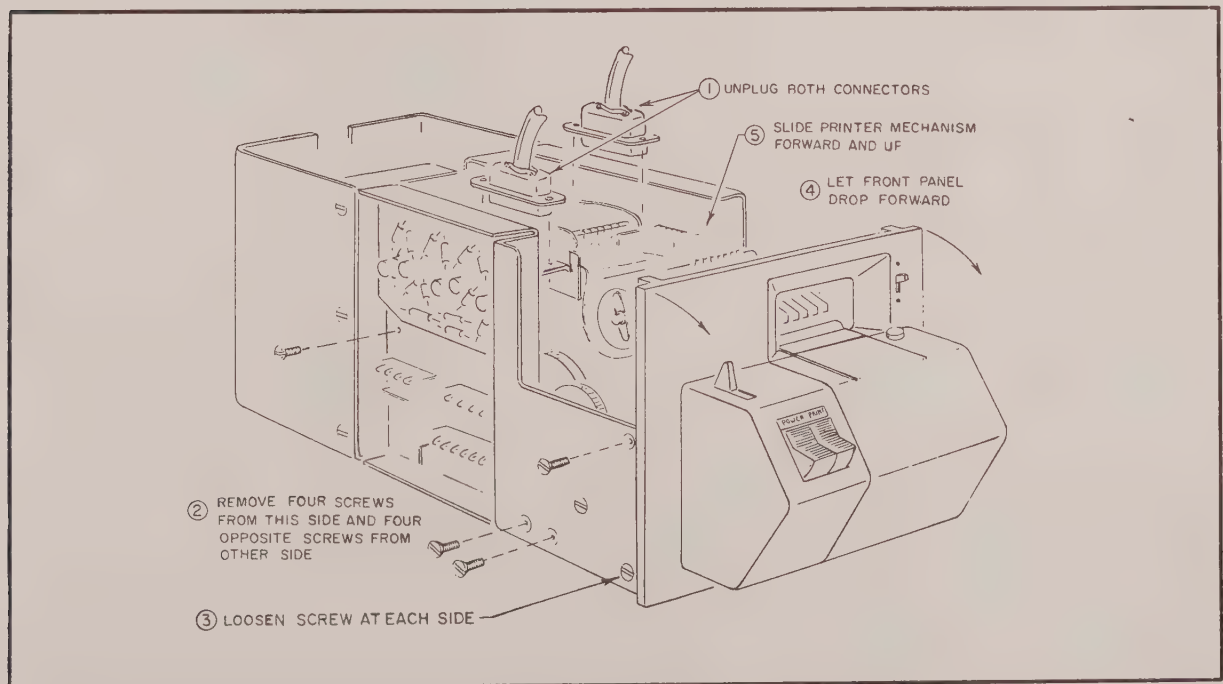


FIG. 4-1. Removing Printer Mechanism.

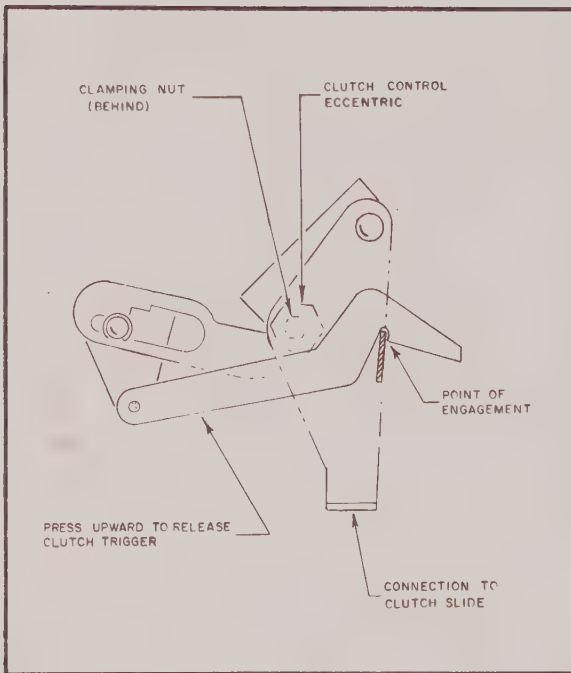


FIG. 4-2. Adjusting Clutch Control Eccentric.

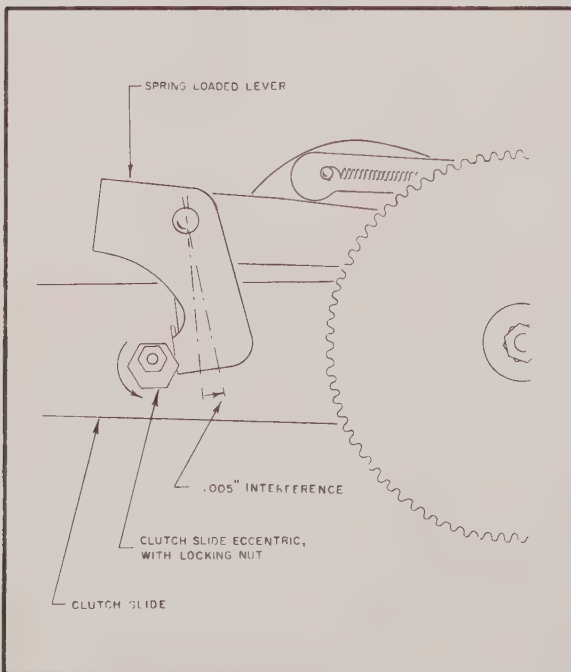


FIG. 4-3. Adjusting Clutch Slide Eccentric.

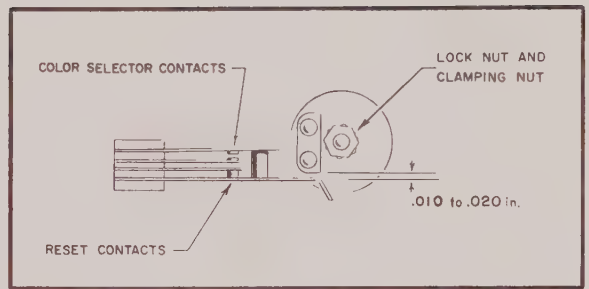


FIG. 4-4. Correct adjustment of cam switch at normal rest position.

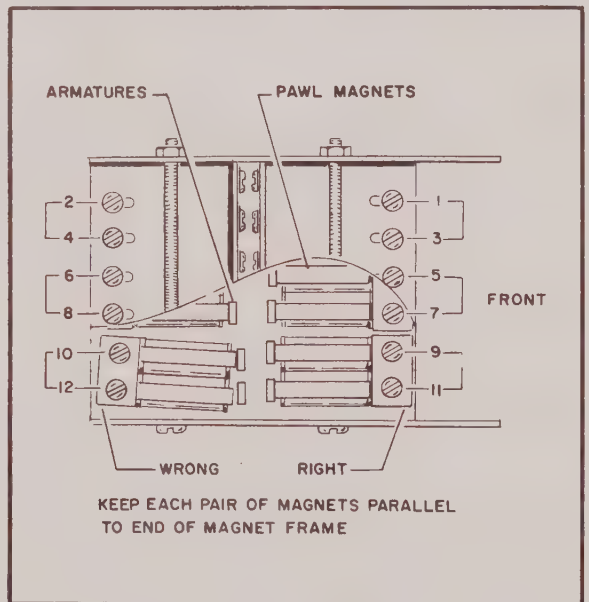


FIG. 4-5. Internal arrangement of pawl magnet assembly as seen from above printer (for side view see Figure 3-11).

4.2 TROUBLESHOOTING

To gain a thorough understanding of the circuit logic, first study Section 3 and the Timing Diagram on page 5-4a. Then refer to the following tables which summarize possible troubles, their causes and solutions.

Table 4-1. Troubleshooting

PROBLEM	POSSIBLE CAUSE AND/OR SOLUTION
PRINT Command does NOT start cycle	1) Make sure print switch is in PRINT position. 2) Check if print command is reaching control trigger circuit. Watch color selector (K102). Even with print switch at STANDBY, K102 should be energized when print command line is negative; de-energized when positive. 3) Measure voltage at pin 7 of V101. It should be identical to print command line input. 4) Continuity-check print command line up to pin 5 of connector C. 5) Check cam switch adjustment (see Table 4-2). 6) Measure signal at collector of Q107. The collector should be at ground when print command line is negative; at -28 volts when positive. 7) Replace V101. 8) Check Q107 as follows: a) Connect pin 8 of V101 to +16 volts (collector should be negative). b) Remove V101. Collector should be between -10 volts and ground. If not, replace Q107. 9) Check clutch actuator driver, Q108, as follows: a) Using a scope, determine what occurs at the collector of Q108 during a print command. b) If the collector does not move to ground for at least 20 ms, adjust or clean contacts on K103C (Fig. 3-9). c) Check Q108 or T102 (may be defective). 10) See whether K103 is being actuated as follows: a) Ground collector of Q108 through 100 mA meter. (The clutch should operate mechanism continuously with a current of 80 mA.) b) If current does not flow, the winding of K102 is open, or there is a break in the wiring to K103. c) If current is flowing and K103 is energized, the clutch actuating mechanism is out of adjustment.
Single Print Command produces more than one cycle of operation. (Cause may be electrical or mechanical)	1) Place mechanism in an unwanted cycle and set PRINT switch to STANDBY. If printer stops at end of cycle, problem is electrical. Proceed as follows: a) Set POWER switch to OFF. b) Cycle mechanism by hand while watching operating sequence of type alignment bar and reset contacts (lower set) on cam switch. c) Close contacts fully and separate from cam one-half turn of plastic gear before type alignment bar touches clutch actuator. d) Adjust cam switch timing (see Table 4-2). 2) Repeat step 1. If K103 is energized and switching to STANDBY does not stop operation, either the type alignment bar does not press armature of K103 far enough to break latching contacts, or Q108 has excessive collector leakage. Proceed as follows:

. . . continued

Table 4-1. Troubleshooting (continued)

PROBLEM	POSSIBLE CAUSE AND/OR SOLUTION
	a) Pull out connector P102 (at left front of mechanism) to stop the motor. b) Energize K103 with a single print command. c) Operate mechanism by hand until type alignment bar presses armature of K103. (The motion should be enough to press armature against frame of magnet, releasing it; the magnet should then remain de-energized.) NOTE If mechanical action is correct, remove connector P101 (on pawl magnet assembly) and press PRINT switch to STANDBY to prevent actuation of Q108. Place milliammeter between collector of Q108 and -28 volt supply to determine leakage. At high-line voltage (135V rms) leakage must not exceed 50 microamps at 25°C. If greater, replace Q108. 3) Repeat step 1. If clutch actuator is de-energized and cycle continues: a) Turn off the printer and check adjustment of clutch control eccentric (see Table 4-2). b) If this appears correct, increase spring tension on clutch trigger by pulling spring sideways (spring runs from trigger to actuator frame). c) If operation improves, shorten spring slightly. d) Make sure that mechanism works well at low line voltage (95 volts rms).
One or more columns do NOT print	1) Make sure modules are not upside down or loose in their sockets. 2) Replace suspected module with one from a correct column (to rule out possibility of defective module). 3) Check for changing input data after print command. Data should not change. 4) Remove input connector from module in faulty column and operate printer (column should print a random number). If a blank impression is produced, the pawl magnet for that column may be out of position. Adjust magnet as described in Table 4-2.
All columns produce blank impression	1) Measure all supply voltages to rule out failure of power supply. 2) Check reset line (should be at -14 volts when mechanism is in rest position.) Reset failure may be due to wrong adjustment of cam switch. (Figure 4-4 shows correct adjustment.) 3) Make sure there is no change in input data after print command. 4) Inspect pawl magnet assembly (mechanism may be jammed so that stop pawls do not reset). Operate mechanism by hand, making sure that pawl reset link (right side, internal) advances and suddenly retracts near end of cycle, actuating pawl reset bail. The overtravel spring should not operate. 5) Check if pawl reset link is in place over end of cam actuating lever. There should be a small coil spring running down and back from lever to side plate.

Table 4-2. Mechanical Adjustments

PART	ADJUSTMENT
Clutch Control Eccentric	When a single print command produces more than one cycle of operation, the clutch control eccentric may be out of adjustment (as indicated in Table 4-1). - Manually operate printer through one cycle until clutch slide has moved to its most rearward position (Fig. 4-2). - Loosen clamping nut. - Turn eccentric so that clutch trigger engages with a minimum of overtravel of clutch slide. (Movement of slide from its extreme position to its normal cocked position should be less than 0.030 inches.)
Clutch Slide Eccentric	Adjust clutch slide eccentric after adjustment of clutch control eccentric (above). Adjust for 0.005 inch interference between eccentric and spring-loaded lever that bears on it (Fig. 4-3).
Cam Switch	Adjust cam switch timing by moving the cam on its shaft (Fig. 4-4). - Loosen lock nut and clamping nut. - Rotate cam so that (in normal rest position) it clears follower leaf by 0.010 to 0.020 inches. Adjustment is correct when reset contacts do not open with normal overtravel of shaft, but open before excursion control bar begins to move as machine is cycled.
Pawl Magnet Position	The pawl magnet assembly (located on top of the type bars) comprises either eight or twelve pawl magnets arranged in pairs (see Figures 4-5 and 3-11). Each pair is held to the magnet frame by two slotted screws. Proceed as follows if troubleshooting procedure (Table 4-1) indicates that a pawl magnet is out of position (see Fig. 4-5): - Loosen pair of screws holding suspected magnet. (Do not remove screws.) - Place power to OFF and mechanism in rest position. Carefully move magnet until it touches the armature. - Center both magnets of the pair on their armatures. (Figure 4-5 shows right and wrong adjustments.) Clearance between magnet cores and armatures should be zero in reset (rest) position, but cores should exert no significant force on the armatures. - Tighten clamping screws. - Make sure machine is printing correctly, then lock screws with Glyptol or similar substance.

Table 4-3. Lubrication Procedure

————— CAUTION ————— <i>Carefully clean bearings and surfaces before applying lubricants. Since oil dissolves grease, make sure that oil does not run onto greased surfaces. Oil first, wipe off all excess, then apply grease.</i> —————	
Oiling of mechanical parts with enclosed bearing surfaces (levers, rollers on shafts, sliding members in close-fitting guides):	1) Use a good grade of light machine oil. 2) Lubricate mechanism every 500,000 impressions, or every six months.
Greasing of mechanical parts (cam surfaces, loose-fitting sliding members, gear teeth, needle bearing of main cam shaft):	1) Apply a high-grade grease, such as Lubriplate #2. 2) Grease mechanism every 500,000 impressions, or every six months.

————— NOTE —————

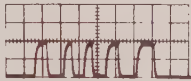
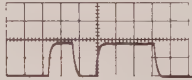
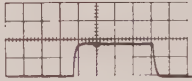
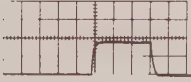
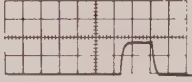
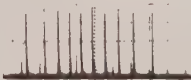
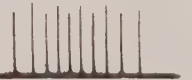
Bearings of drive motor are packed and sealed at the factory. They require no maintenance.

—————

Table 4-4. Typical Waveforms

NOTE

Oscilloscope used: Tektronix Model 581 with type CA Preamplifier. All signals dc coupled.

TEST POINT	SIGNAL	VERT. SCALE	TIME SCALE	WAVEFORM
CODE GENERATOR OUTPUTS	POSITIVE SYNC ON RESET LINE P202, pin 7			
P202, pin 1	Line 1 (1st bit): binary pulse output of Position Transducer.	5V/Div.	10ms/Div.	1-2-2-4 Code  Weight 1 1-2-4-2 (1-2-4-8) Code  Weight 1
P202, pin 2	Line 2 (2nd bit)	5V/Div.	10ms/Div.	 Weight 2  Weight 2
P202, pin 4	Line 3 (3rd bit)	5V/Div.	10ms/Div.	 Weight 2  Weight 4
P202, pin 6	Line 4 (4th bit)	5V/Div.	10ms/Div.	 Weight 4  Weight 2
P202, pin 5	Clock pulse output of Position Transducer ----- NOTE ----- Both waveforms are identical. In the right-hand picture, the scale has been extinguished for clarity. -----	5V/Div.	10ms/Div.	 Gnd  Gnd

continued

Table 4-4. Typical Waveforms (continued)

TEST POINT	SIGNAL	VERT. SCALE	TIME SCALE	WAVEFORM
<u>CONTROL SIGNALS</u> Q108, Collector	Clutch Actuation Voltage Sync: Positive, on Signal	10V/Div.	20ms/Div.	
Q107, Collector	Color Control, Red Sync: Positive, on Q108 Collector	10V/Div.	20ms/Div.	
Q107, Collector	Color Control, Black Sync: Positive, on Q108 Collector	10V/Div.	20ms/Div.	
a) P202, pin 9 b) P202, pin 1	a) Pawl magnet voltage, digit "5". b) Position Transducer Output Sync: Positive, on reset line (P202, pin 7)	a) 20V/Div. b) 10V/Div.	a) 10ms/Div. b) 10ms/Div.	
P202, pin 9	Pawl magnet voltage Sync: Negative on Signal	20V/Div.	1ms/Div.	
Q201, Base	Coincidence Output, Digit "7" Sync: Positive, on reset line (P202, pin 7)	2V/Div.	10ms/Div.	

4.3 TRANSDUCER ADJUSTMENT

The transducer is generally considered a factory adjustment item requiring little attention, if any, during the normal operating life of the instrument. However, it is a rather critical adjustment and is thus subject to some degradation from mishandling during transportation. As a result, some minor readjustment may be required at the time of initial installation.

4.3.1 Check-out

After all other installation procedures have been executed, set the input to the printer for a known, stable set of numbers, preferably all zeros, ones, twos, threes, etc. Then supply a

series of print commands and observe the read-out. Change the input signals and repeat the procedure. It is recommended that from three to five different series of numbers be tried. If no misprints are observed, your printer is ready to use and requires no readjustment of the transducer. This same procedure is recommended as a periodic maintenance check.

Should an erratic printout be observed, some slight adjustment of the transducer may be required. Use the following procedure.

4.3.2 Adjustment Procedure

See Figure 4-6. Note the location of the transducer adjustment screw. With the printer off,

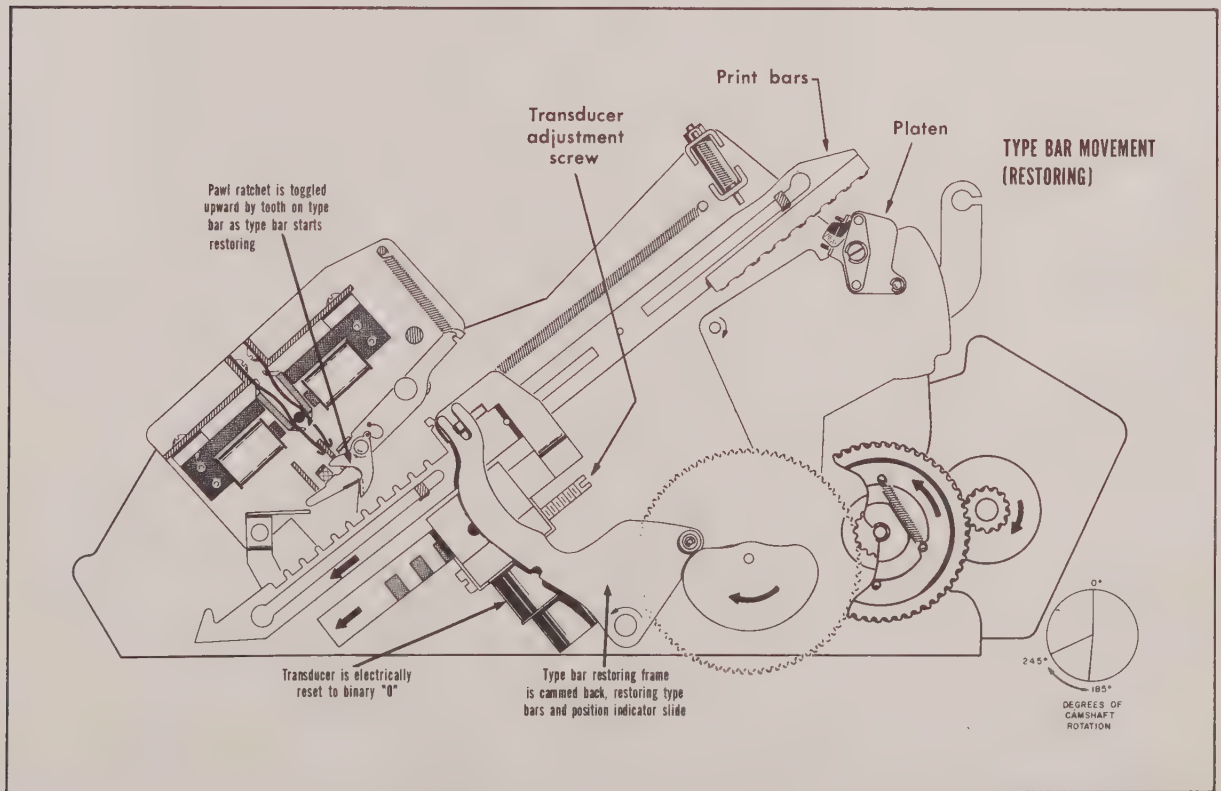


FIG. 4-6. Transducer Adjustment

this screw can be reached by inserting a long, thin-shafted screwdriver between the print bars and the platen.

If the observed printout is one number lower than programmed in one or more columns, turn the transducer adjustment screw one-quarter to one-half turn clockwise.

If the observed printout is one number higher than programmed in one or more columns, turn the transducer adjustment screw one-quarter to one-half turn counterclockwise.

After making the above adjustment, recheck the series of numbers previously found in error and

repeat the adjustment procedure as required. This should not exceed one and one-half to two turns in either direction from the initial factory set point.

When only one print bar produces a misprint and this cannot be corrected by the above procedure, then inspect for dirt or other foreign particles clinging to the print bar in question and clean as necessary.

If misprinting has not been corrected by the above procedure, contact your nearest Beckman Electronic Instruments Field Service Headquarters for assistance.

SECTION 5

DIAGRAMS & PARTS LISTS

	<u>Dwg. No.</u>	<u>Page</u>
Printer Shell Assembly Parts List		5-2
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Master Schematic Diagram	D419670-C	5-5
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Four-Line Input Cable Schematic Diagram	62 - D - 56	5-10
Ten-Line Input Module Assembly "A" Component Layout	A404476-A	5-11
Ten-Line Input Module Assembly "B" Component Layout	A404478-C	5-11
Ten-Line Input Module Parts List		5-12
Ten-Line Input Code Module Schematic Diagram	C404454-B	5-13
Ten-Line Input Cable Schematic Diagram	C405888-A	5-14
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NOTE

For additional parts ordering information, see the Burroughs Parts Catalog.

PRINTER SHELL ASSEMBLY
PARTS LIST

<u>Detail No.</u>	<u>Beckman Stock No.</u>	<u>Description</u>	<u>Typical Manufacturer & No.</u>	<u>Qty. / Ass'y</u>
	855-419661	Printer Shell Assembly	Beckman	1
C101, 102, 103, 121, 125, 126	651-099620	Capacitor, F. Paper, 0.1 μ f, 400V, 20%	Cornell-Dubilier WMF4P1	6
C104 thru C113	637-804765	Capacitor, F. Mica, 220pf, 500V, 5%	Sangamo RR1322	10
C114	631-005621	Capacitor, F. Elect., 3000 μ f, 15V	Sprague TVL1170	1
C115	631-401953	Capacitor, F. Elect., 3000 μ f, 30V	Beckman	1
C116	631-812751	Capacitor, F. Elect., Dual, 1000-2000 μ f	Mallory WP200.2	1
C118, 119	633-808479	Capacitor, F. Cerm., 0.02 μ f, 150V	Centralab DDM-203	2
C120	637-804751	Capacitor, F. Mica, 75pf, 500V, 5%	Sangamo RR1475	1
C122, 124	633-804706	Capacitor, F. Cerm., 1000pf, 1000V	Centralab DD-102 (10%)	2
CR101 thru CR106, 117	755-416842	Diode	Beckman	7
CR107 thru 115	755-409096	Diode, Special	Beckman	9
CR116, 118, 119	755-402107	Diode, Special	Beckman	3
CR120 thru 123	755-404593	Diode, Special	Beckman	4
F101, 102	731-814854	Fuse, Elect., 1.0A, 125V	Littelfuse Type 313	2
J101	672-806814	Connector, Receptacle, 25 Female	Cannon DB-25S	1
J102	672-812863	Connector, Plug, 15 Female	Cannon DA-15S	1
P101	664-812450	Cordset, Elect., Power, 3 Cond., Blk, 6 feet	Beckman	1
P104	678-806896	Connector, Plug, Header, 11-pin	Amphenol 86-CP11	1
P105	678-099028	Connector, Plug, Header, 8-pin	Jones 8PB	1
Q101 thru Q106	755-800398	Transistor, Germ., PNP, 150mW	Sylvania 2N404	6
Q107, 108	755-406666	Transistor, Special	Beckman	2
R101, 105, 108, 112 thru 118, 120, 123, 125, 126, 128, 130, 133, 134, 139, 141	601-008089	*Resistor, 12K, 1/2W, 10%	*AB EB1231	20
R102, 103, 104, 106, 107, 109, 110, 111, 136, 151	601-008078	Resistor, 1.5K, 1/2W, 10%	AB EB1521	10
R119, 124, 127, 129, 131, 132, 140, 147	601-008094	Resistor, 33K, 1/2W, 10%	AB EB3335	8
R121	601-008059	Resistor, 2.2K, 1W, 10%	AB GB2221	1
R122	601-008866	Resistor, 2.2M, 1/2W, 10%	AB EB2251	1
R135	601-801559	Resistor, 47K, 1/2W, 10%	AB EB4731	1
R137	601-008087	Resistor, 8.2K, 1/2W, 10%	AB EB8225	1
R138	601-008065	Resistor, 100 Ω , 1/2W, 10%	AB EB1011	1
R142	601-002211	Resistor, 100K, 1/2W, 10%	AB EB1041	1

*All resistors are fixed composition; Manufacturer - Allen Bradley.

. . . continued

PRINTER SHELL ASSEMBLY (continued)

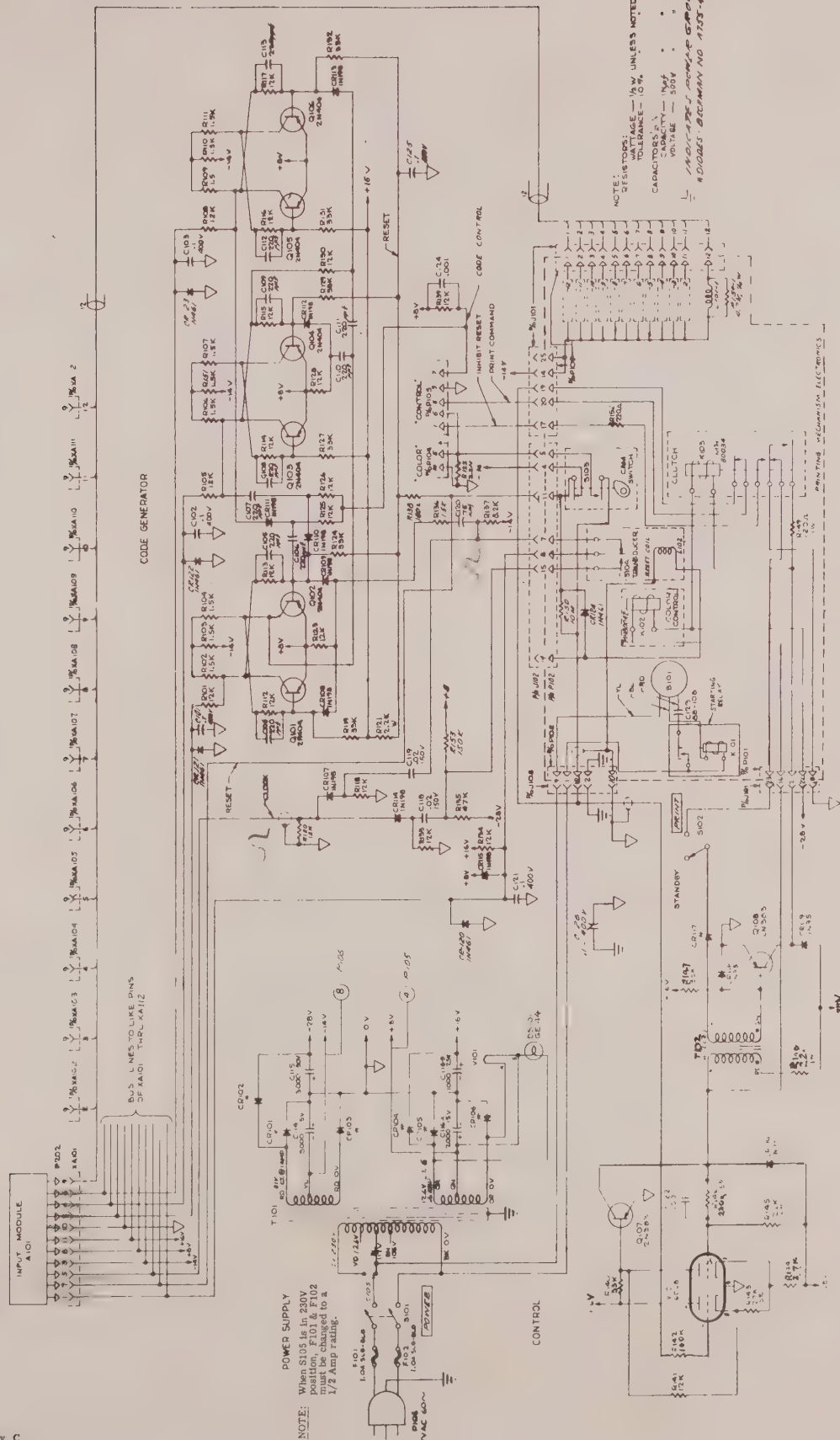
PARTS LIST

<u>Detail No.</u>	<u>Beckman Stock No.</u>	<u>Description</u>	<u>Typical Manufacturer & No.</u>	<u>Qty. / Ass'y</u>
R143	601-015058	Resistor, 27K, 1/2W, 5%	Allen Bradley EB2735	1
R144	601-015045	Resistor, 2.7K, 1/2W, 5%	Allen Bradley EB2725	1
R145	601-000565	Resistor, 22K, 1/2W, 5%	Allen Bradley EB2235	1
R146	601-015083	Resistor, 220K, 1/2W, 5%	Allen Bradley EB2245	1
R148	601-008059	Resistor, 2.2K, 1W, 10%	Allen Bradley GB2221	1
R153	601-008774	Resistor, 150K, 1/2W, 10%	Allen Bradley EB1541	1
R154	601-815239	Resistor, 4.7K, 1/4W, 10%	Allen Bradley CB4721	1
S105	716-829988	Switch, Slide	Carling Elec. S-112-RD	1
T101	792-418625	Transformer, Power	Beckman	1
T102	792-812868	Transformer, Interstage	Triad A-122Z	1
V101	751-800237	Electron Tube, Duotriode, Type 6DJ8	Amperex 6DJ8	1
XDS101	824-815706	Socket, Lamp, w/22 in. leads	Leecraft 2-06-Modif	1
XF101, 102	735-007268	Fuseholder, 15A at 250V Breakdown	Bussman HKP	2
XV101	860-002064	Socket, Tube, 9-pin, w/shield base (p/o 40-404641)	Cinch Mfg. 44B12621	1
	697-812867	Connector, Hood, (for DA-15 Connectors)	Cannon DA-J/S	1
	697-807056	Connector, Hood, (straight for DB25 Connector)	Cannon DA-J/S	1
	697-812865	Screw Lock Assembly, Male	Cannon DA20419	4
	860-016990	Socket, Tube, 11-pin, Saddle Mtg.	Amphenol 77-M1P-11	12
	664-404647	Module Cable	Beckman	1
	664-404649	Power Cable	Beckman	1
	855-404623	Magnet Coil Assembly	Beckman	1
	877-404624	Bobbin, Magnet Coil	Beckman	1
	795-404622	Magnet Coil	Beckman	1
	279-812854	Ribbon, black/red, med. 7/16"	Burroughs	1

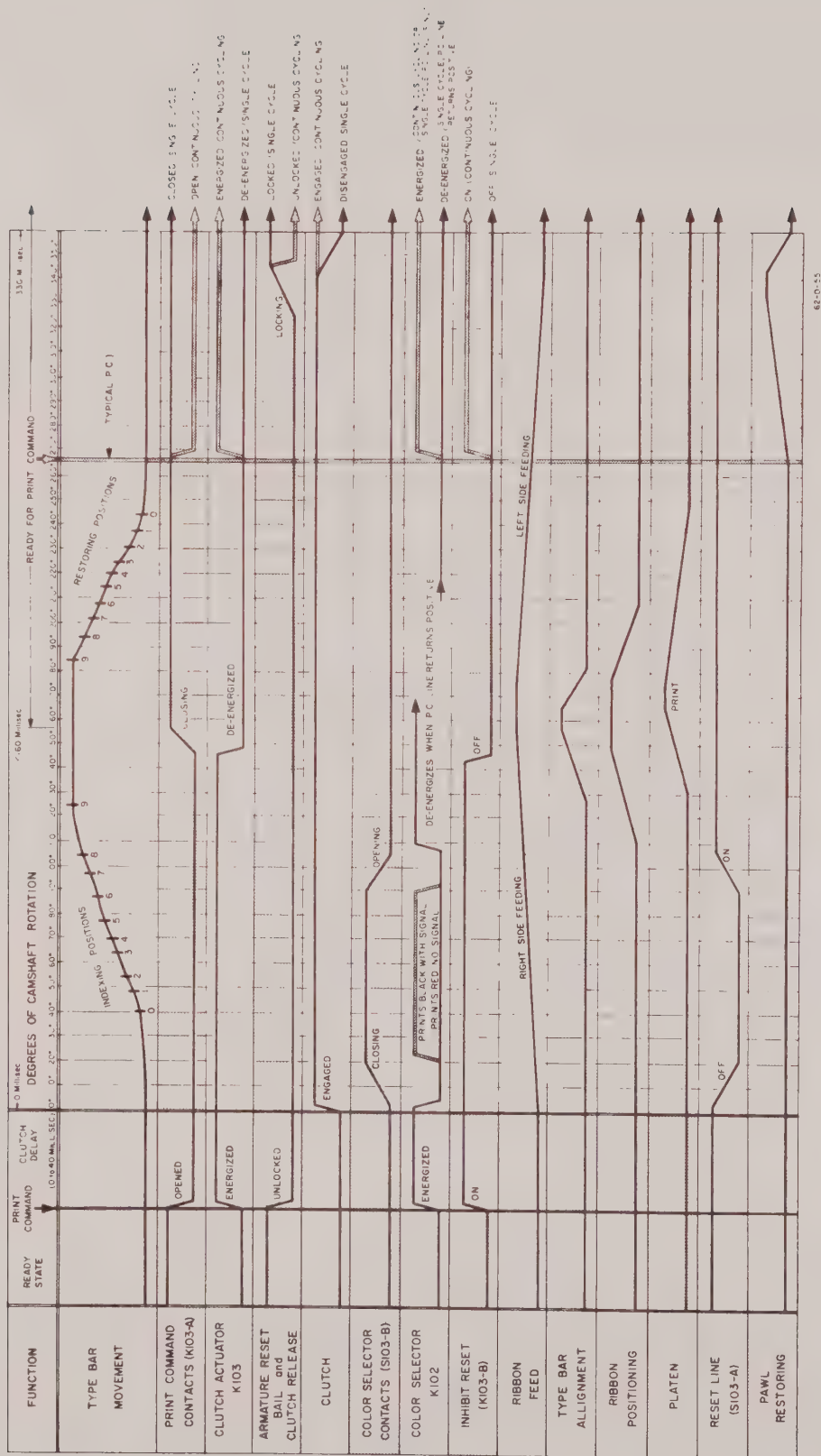
8-DIGIT & 12-DIGIT PRINTER
PARTS LIST

<u>Detail No.</u>	<u>Beckman Part No.</u>	<u>Description</u>	<u>Typical Manufacturer & No.</u>	<u>Qty. / Assy.</u>
	050-419090	Eight-Digit Printer	Beckman	
	050-419091	Twelve-Digit Printer	Beckman	
C123	631-437055	Capacitor, Special	Beckman	1
CR124	755-404593	Diode, Silicon, Special	Beckman	1
DS101	825-099143	Lamp, Incandescent, Min., Bayonet Base	G. E. #44	1
K101	718-857432	Relay, Motor Starting	Burroughs 1051- 3265	1
K102	718-405661	Relay, Form B, 21V Pull-In	Beckman	1
K103	718-405660	Relay, Form I and Form B, 18V Pull- In	Beckman	1
L101	795-404622	Magnet Coil	Beckman	1
P101	672-806813	Connector, Receptacle, 25 Male Contacts	Cannon DB-25P	1
P102	672-815017	Connector, Receptacle, 15 Male Contacts	Cannon DA-15P	1
R149	601-029801	Resistor, 120Ω, 1W, 10%	*A. B. GB1211	1
R150	601-011180	Resistor, 10M, 1/2W, 10%	A. B. EB1061	1
R152	601-008069	Resistor, 220Ω, 1/2W, 10%	A. B. EB2211	1
S101, 102	716-404452	Switch, Push, 2 ea. DPDT Sections	Beckman	1
S103	716-404717	Switch, Cam, Form A and Form B	Beckman	1
S104	716-857264	Relay	Clare RP8425G1	1
	662-404732	P102 Cable	Beckman	1
	855-404623	Magnet Coil Assembly	Beckman	12
	855-406359	Magnet Assembly, 12 Digit	Beckman	1

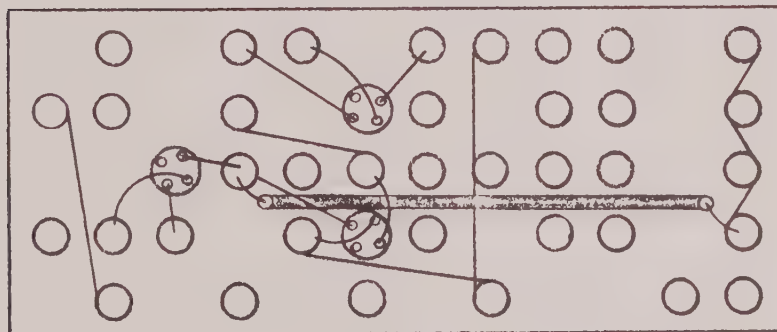
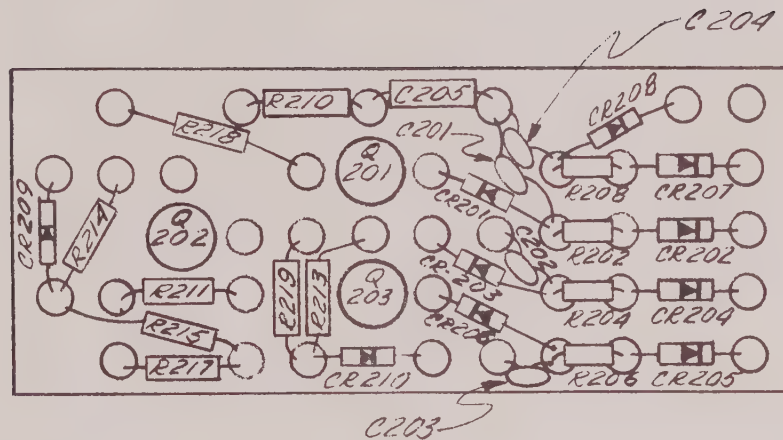
"A. B." are Allen Bradley, fixed composition resistors.



MODEL 1453 MASTER SCHEMATIC DIAGRAM



TIMING DIAGRAM

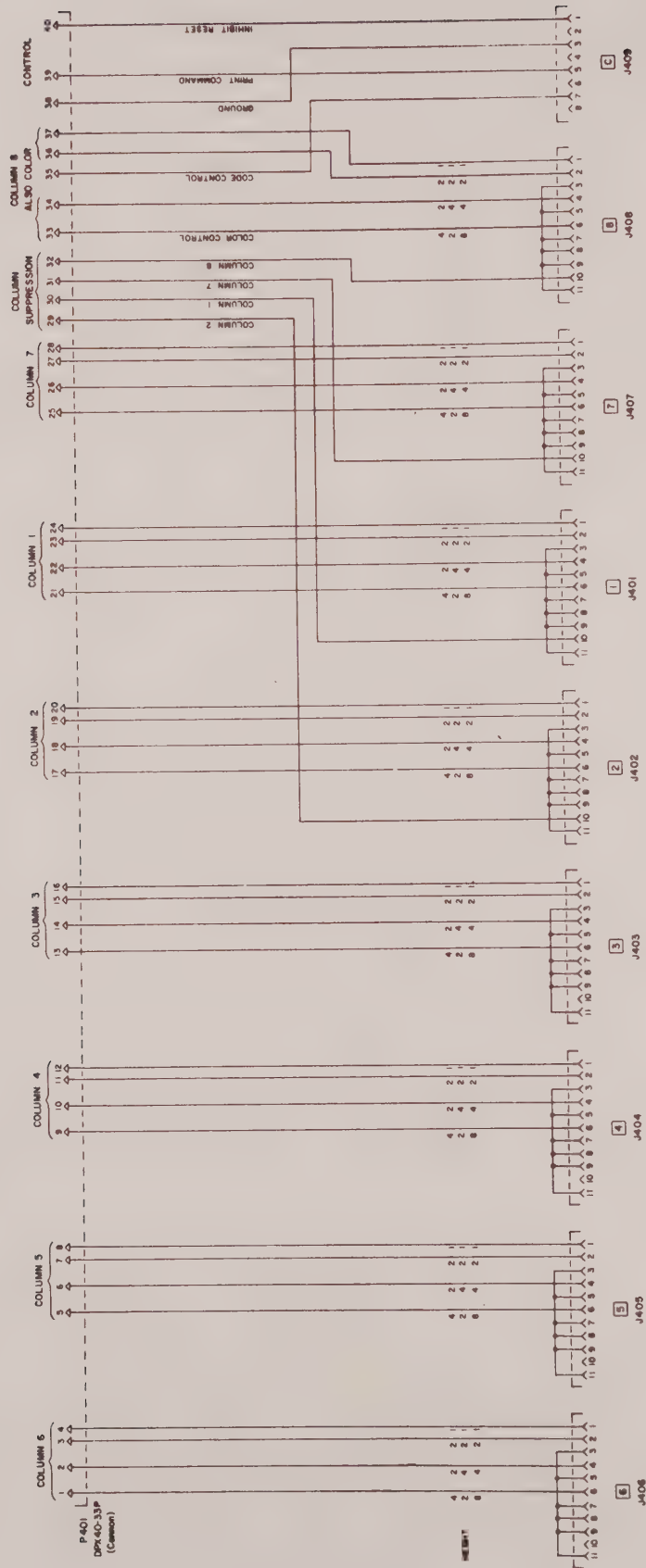


FOUR-LINE INPUT MODULE ASSEMBLY
COMPONENT LAYOUT

**FOUR-LINE INPUT MODULE
PARTS LIST**

<u>Detail No.</u>	<u>Beckman Part No.</u>	<u>Description</u>	<u>Typical Manufacturer & No.</u>	<u>Qty. / Assy.</u>
	887-404459	Four-Line Module Final Assembly	Beckman	
	855-404474	Four-Line Module P. C. Board	Beckman	1
C201, 202, 203, 204	633-804706	Capacitor, Ceramic Disc, 0.001 μ f, 1 KV	Centralab DD-102	4
C205	637-804765	Capacitor, F. Mica, 220pf, 500V, 5%	Sangamo RR1322	1
CR201 thru CR209	755-404593	Diode, Silicon	Beckman	9
CR210	755-402107	Diode, Selected	Beckman	1
P201, 202	678-806896	Plug, 11-Pin, (Header)	Amphenol 86-CP11	2
Q201	755-800415	Transistor	G. E. 2N585	1
Q202	755-817800	Transistor, 2N398A	Motorola	1
Q203	755-800398	Transistor, 2N404	Sylvania	1
R201 thru R209	601-812742	Resistor, 220K, 1/4W, 10%	*A. B. CB2241	9
R210, 218	601-008085	Resistor, 5.6K, 1/2W, 10%	A. B. EB5621	2
R211	601-008089	Resistor, 12K, 1/2W, 10%	A. B. EB1231	1
R212	601-008073	Resistor, 560 Ω , 1/2W, 10%	A. B. EB5611	1
R213	601-008080	Resistor, 2.2K, 1/2W, 10%	A. B. EB2221	1
R214, 219	601-010684	Resistor, 3.3K, 1/2W, 10%	A. B. EB3321	2
R215, 216 R217	601-008084	Resistor, 4.7K, 1/2W, 10%	A. B. EB4721	3

*"A. B." are Allen Bradley, fixed composition resistors.



NOTE:
 J401 thru J408 Assembled 7B-S1T
 J409 Assembled 7B-S3

68-D-56

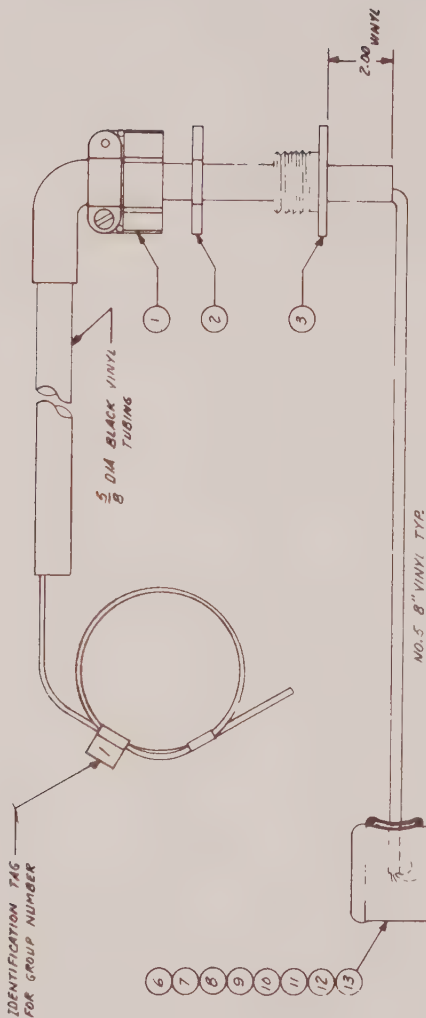
FOUR-LINE INPUT CABLE SCHEMATIC DIAGRAM

TEN-LINE INPUT MODULE
PARTS LIST

<u>Detail No.</u>	<u>Beckman Stock No.</u>	<u>Description</u>	<u>Typical Manufacturer & No.</u>	<u>Qty. / Ass'y</u>
	887-404453	Ten-Line Module Final Ass'y	Beckman	
	855-404476	Ten-Line Module Board "A"	Beckman	
	855-404478	Ten-Line Module Board "B"	Beckman	
C301 thru C308, C310	633-804706	Capacitor, Ceramic Disc., 0.001 μ f, 1KV	Centralab DD-102	9
C309	637-804765	Capacitor, F.Mica, 220pf, 500V, 5%	Sangamo RR1322	1
CR301 thru CR323, 325, 326	755-404593	Diode, Silicon	Beckman	25
CR324	755-402107	Diode, Selected	Beckman	1
P301, 302	678-806896	Plug, 11-pin, (Header)	Amphenol 86-CP11	2
Q301	755-800415	Transistor	G.E. 2N585	1
Q302	755-817800	Transistor, Type 2N398A	Motorola	1
Q303	755-800398	Transistor	Sylvania 2N404	1
R301, 302, R304 thru 319, R329	601-812742	Resistor, F.C., 220K, 1/4W, 10%	Allen Bradley CB2241	19
R303, 324	601-010684	Resistor, F.C., 3.3K, 1/2W, 10%	Allen Bradley EB3321	2
R320, 325	601-008085	Resistor, F.C., 5.6K, 1/2W, 10%	Allen Bradley EB5621	2
R321	601-008089	Resistor, F.C., 12K, 1/2W, 10%	Allen Bradley EB1231	1
R322	601-008073	Resistor, F.C., 560 Ω , 1/2W, 10%	Allen Bradley EB5611	1
R323	601-008080	Resistor, F.C., 2.2K, 1/2W, 10%	Allen Bradley EB2221	1
R326, 327, 328	601-008084	Resistor, F.C., 4.7K, 1/2W, 10%	Allen Bradley EB4721	3
S301	716-812753	Switch, Slide, DPDT	Oak Mfg. Co., Type 78	1

TEN-LINE INPUT CABLE SCHEMATIC DIAGRAM

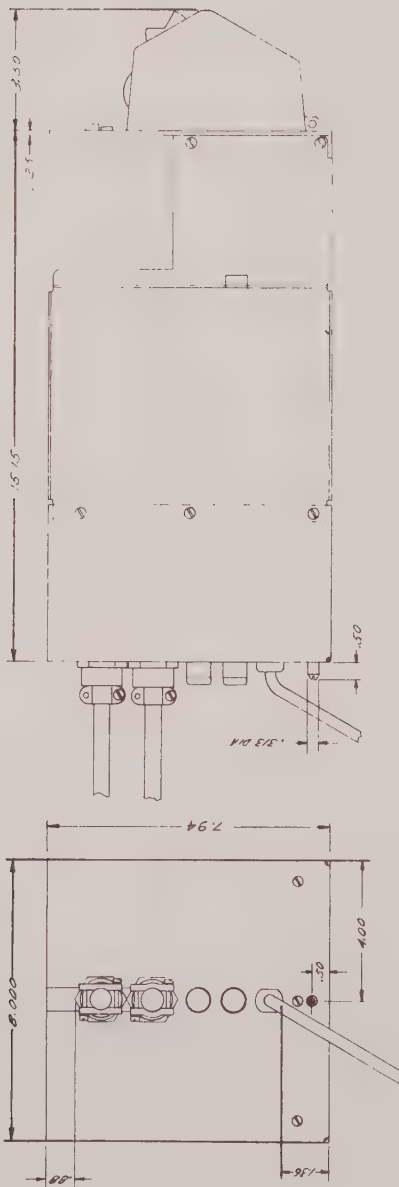
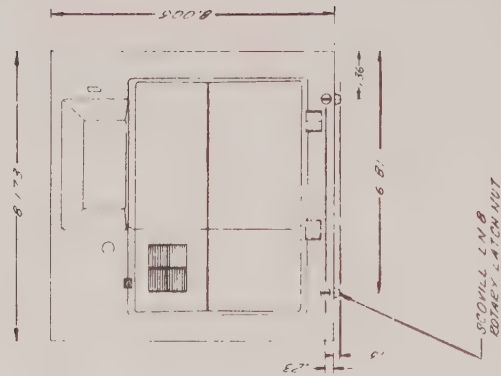
WIRE NO.	PIN NO.	COLOR
910	1	BN-BK
911	2	BN-BN
912	3	BN-RD
913	4	BN-YL
914	5	BN-BK
915	6	BN-BN
916	7	BN-RD
917	8	BN-YL
918	9	BN-BK
919	10	BN-BN
920	11	BN-RD
921	12	BN-YL
922	13	BN-BK
923	14	BN-BN
924	15	BN-RD
925	16	BN-YL
926	17	BN-BK
927	18	BN-BN
928	19	BN-RD
929	20	BN-YL
930	21	BN-BK
931	22	BN-BN
932	23	BN-RD
933	24	BN-YL
934	25	BN-BK
935	26	BN-BN
936	27	BN-RD
937	28	BN-YL
938	29	BN-BK
939	30	BN-BN
940	31	BN-RD
941	32	BN-YL
942	33	BN-BK
943	34	BN-BN
944	35	BN-RD
945	36	BN-YL
946	37	BN-BK
947	38	BN-BN
948	39	BN-RD
949	40	BN-YL
950	41	BN-BK
951	42	BN-BN
952	43	BN-RD
953	44	BN-YL
954	45	BN-BK
955	46	BN-BN
956	47	BN-RD
957	48	BN-YL
958	49	BN-BK
959	50	BN-BN
960	51	BN-RD
961	52	BN-YL
962	53	BN-BK
963	54	BN-BN
964	55	BN-RD
965	56	BN-YL
966	57	BN-BK
967	58	BN-BN
968	59	BN-RD
969	60	BN-YL
970	61	BN-BK
971	62	BN-BN
972	63	BN-RD
973	64	BN-YL
974	65	BN-BK
975	66	BN-BN
976	67	BN-RD
977	68	BN-YL
978	69	BN-BK
979	70	BN-BN
980	71	BN-RD
981	72	BN-YL
982	73	BN-BK
983	74	BN-BN
984	75	BN-RD
985	76	BN-YL
986	77	BN-BK
987	78	BN-BN
988	79	BN-RD
989	80	BN-YL
990	81	BN-BK
991	82	BN-BN
992	83	BN-RD
993	84	BN-YL
994	85	BN-BK
995	86	BN-BN
996	87	BN-RD
997	88	BN-YL
998	89	BN-BK
999	90	BN-BN
1000	91	BN-RD



NOTES:
1) WIRE LENGTHS TO BE 12.0"
2) VINYL LENGTH TO BE 10.0"

PRINT COMMAND 965 GY-EN
GROUND 985 GY-OR
INHIBIT RESET 981 GY-BN
916 BN-BL
915 BN-EN
914 BN-YL
913 BN-OR
912 BN-RD
911 BN-BN
926 RD-BL
925 RD-EN
924 RD-YL
923 RD-OR
922 RD-RD
921 RD-BN
936 OR-BL
935 OR-EN
934 OR-YL
933 OR-OR
932 OR-RD
931 OR-BN
946 YL-BL
945 YL-EN
944 YL-YL
943 YL-OR
942 YL-RD
941 YL-BN
956 GN-BL
955 GN-EN
954 GN-YL
953 GN-OR
952 GN-RD
951 GN-BN
967 BL-VO
966 BL-GY
965 BL-OR
964 BL-OR
963 BL-OR
962 BL-OR
961 BL-OR
977 VO-VO
976 VO-OR
975 VO-OR
974 VO-OR
973 VO-OR
972 VO-OR
971 VO-OR
987 BL-VO
986 BL-GY
985 BL-OR
984 BL-OR
983 BL-OR
982 BL-OR
981 BL-OR
997 VO-VO
996 VO-OR
995 VO-OR
994 VO-OR
993 VO-OR
992 VO-OR
991 VO-OR
1000 VO-OR

WIRE NO.	PIN NO.	COLOR
13	1	BN-BK
12	2	BN-BN
11	3	BN-RD
10	4	BN-YL
9	5	BN-BK
8	6	BN-BN
7	7	BN-RD
6	8	BN-YL
5	9	BN-BK
4	10	BN-BN
3	11	BN-RD
2	12	BN-YL
1	13	BN-BK

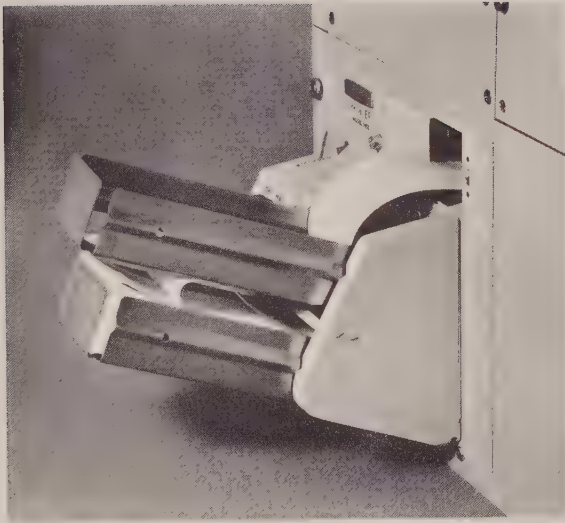


MODEL 1453 INSTALLATION DRAWING

Model 1453
D408030-Rev. A
August 1967



MODEL 507 STORAGE UNIT



The Model 507 Storage Unit permits the use of fan-folded paper tape instead of roll tape.

When fitted with the Model 507 Storage Unit, the printer can store up to 280 feet of 2-1/4 inch fan-folded paper tape. The tape is fed from and accumulated in convenient pull-out trays.

To insert the paper tape, follow these steps:

- 1) Remove upper tray. (Press sides, then pull.)
- 2) Lay tape in lower tray.
- 3) Bend end of paper up toward you. Fold it sharply across to make a straight leading edge.
- 4) Feed end into paper guide below platen (rubber roller).
- 5) Move paper advance lever several times until paper appears in outlet, making sure that paper is between inked ribbon and platen.
- 6) Insert upper tray.
- 7) Press paper release button and pull out enough paper to feed into upper tray.

MODIFYING OLDER BECKMAN INSTRUMENTS

Beckman instruments in current production have readout connections that are correct for the Model 1453. Earlier instruments need a slight modification to suit the printer. The modification automatically suppresses any digit columns not being used. Refer to Table 1 to determine if

a modification is needed. No modification is required if the instrument serial number is higher than that shown in the table. But if the number is the same as or lower than that shown in the table, add the necessary wires to the DIGITAL RECORDER connector on the instrument.

Table 1
Model 1453 Compatibility with Older Beckman Instruments

Model	Highest Serial No.	Pins to be grounded	Model	Highest Serial No.	Pins to be grounded
5210	299	29, 30, 31, 32	7270	200	32
5220	183	29, 30, 31, 32	7350	1430	30, 31, 32
5230	601	29, 30, 31, 32	7351	262	30, 31, 32
5310	140	30, 31, 32	7360	4224	31, 32
5311	120	30, 31, 32	7361	405	31, 32
5571	1314	31, 32	7370	2374	32
7050	462	30, 31, 32	7700	170	31, 32
7060	552	31, 32	8070	104	32
7070	125	32	8150	102	30, 31, 32
7150	1627	30, 31, 32	8151	111	30, 31, 32
7151	437	30, 31, 32	8160	104	31, 32
7152	105	30, 31, 32	8175	111	32
7160	1098	31, 32	8260	101	31, 32
7161	170	31, 32	8350	103	30, 31, 32
7170	435	32	8351	102	30, 31, 32
7175	200	32	8360	102	31, 32
7250	521	30, 31, 32	8370	123	32
7260	396	31, 32			

SERIES J

**TEN KEY
ADDING MACHINE
Before J241308D**

Burroughs

FIELD ENGINEERING

PARTS CATALOG



CARRIAGES

KEYBOARD

SIDE FRAMES

ACCUMULATION

POWER

**BASE &
CASE**

IMPORTANT

This parts catalog, Form 2900, contains parts ordering information on Series J machines constructed before J241308D.

Coverage for machines constructed after J1001F is contained in Series J Parts Catalog, Form 2905.

CAUTION: Verify machine number before using this parts catalog.

PLEASE NOTE

The Burroughs Ten-Key Adding Machine has been modified for use in the Model 1453. For example, the case is not needed because the Model 1453 provides a housing for the mechanism. Also, it is evident that the keyboard is not required.

A list of plates, with associated parts lists, which do not apply to the Model 1453 Printer are:

Plates: 7 thru 9
 20 thru 24
 27 thru 34

These plates have been deleted from the manual.

Burroughs - Series J Parts Catalog

(File After Cover Page)

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CARRIAGE ASSEMBLY AND ROLL PAPER HOLDER—BEFORE J56297D
(Plate 1)



BURROUGHS—SERIES J PARTS CATALOG

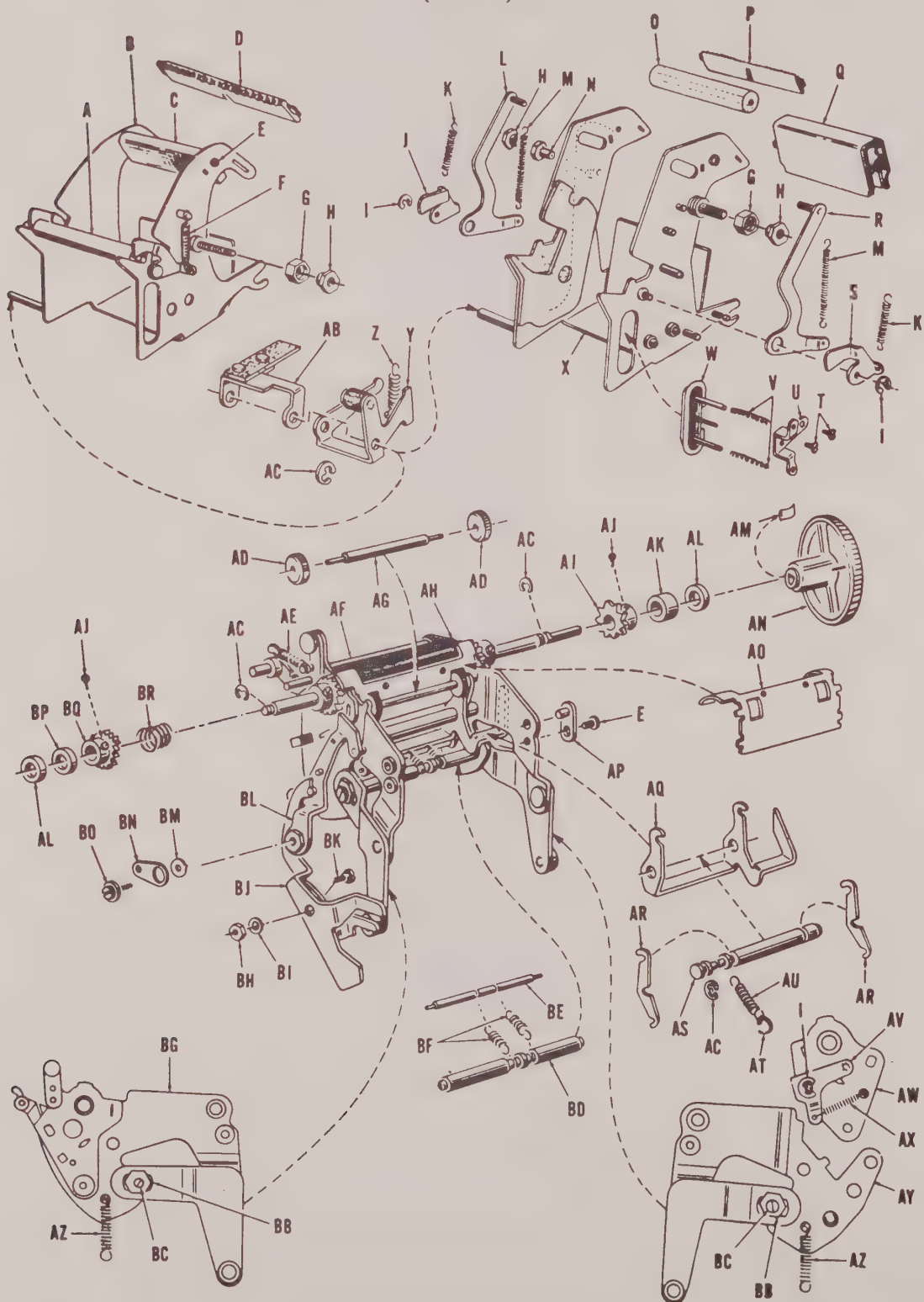
Carriages

PART NUMBERS (Plate 1)

Note: 2JC117 complete assembled carriage

A	X30-42 shown, lock nut	
B	X30-5 flat nut, before J44254D	
B	X30-47 shown, adjusting nut	
C	X30-5 flat nut, before J44254D	
C	JX218 screw, for mounting guide plate	
D	JC5-1 shown, after	roll paper shaft
	J44253D	
	JC5 before	
	J44254D	
E	1JC15-2 roll paper holder frame	
	2JC15 complete assembled roll paper holder	
F	JC16-1 tear off blade	
G	1JC26-1 writing table	
H	X80-24 spring	
I	JC29-2 pressure plate	
J	JX2-1 spring	
K	JC30 pressure plate guide bracket	
L	X60-132 screws	
M	JC18 feed ratchet wheel	
N	JX39 set screw	
O	21 No. 26 clip	
P	JC7-1 paper guide pan	
Q	1JC1 platen assembly	
R	4463 screw	
S	1-8344 set collar, includes R	
T	X81-14 flat retainer spring	
U	JC19 pressure roll	
V	1JC26 guide plate	
W	JC6 pressure roll shaft	
X	JC4 pressure roll release bail shaft	
Y	20 No. 73A spring anchor	
Z	X60-23 carriage restoring spring	
AB	1JC20-6 platen twirler, use spring T	
AC	X60-29 carriage mounting and pivoting screw	
AD	1028 4164 pressure roll release bail after J217188D	
	use 1028 4164 bail and 1028 4065 plug before J217189D	
AE	1JC117-2 right carriage side frame	
AF	JC10 pressure roll lever	
AG	X60-252 locking screw	
AH	JX40 eccentric collar (2 req.)	
AI	JC21 grooved spring shaft	
AJ	12083 springs for pressure roll assembly	
AK	JC3-1 tie shaft	
AL	46 1/4 hex. nut	
AM	X275-23 lockwasher	
AN	JC2-1 shown, after	eccentric tie shaft
	J25608D	
	JC2 before	
	J25609D	
AO	1JC117-3 left carriage side frame	
AP	79804 spring	
AQ	JD85 carriage restoring arm	
AR	45 1/4 hex. nut	
AS	94527 shoulder screw	
AT	X60-28 eccentric screw	
AU	7286 1/2 spring	
AV	1JC13 spacing pawl	
AW	53804 spring	
AX	1JR11-1 left ribbon guide, see Plate 6, for other styles	
AY	71334 No. 3 sleeve	
AZ	JR1 shaft	
BA	X133-105 clip	
BB	1JC12 platen detent assembly	
BC	1JC24 safety switch bail	
BD	1JC23 safety switch bellcrank	
BE	706611 spring	

Carriages

CARRIAGE ASSEMBLY AND ROLL PAPER HOLDER—AFTER J56296D
(Plate 2)

PART NUMBERS ON NEXT PAGE

BURROUGHS—SERIES J PARTS CATALOG

Carriages

PART NUMBERS (Plate 2)

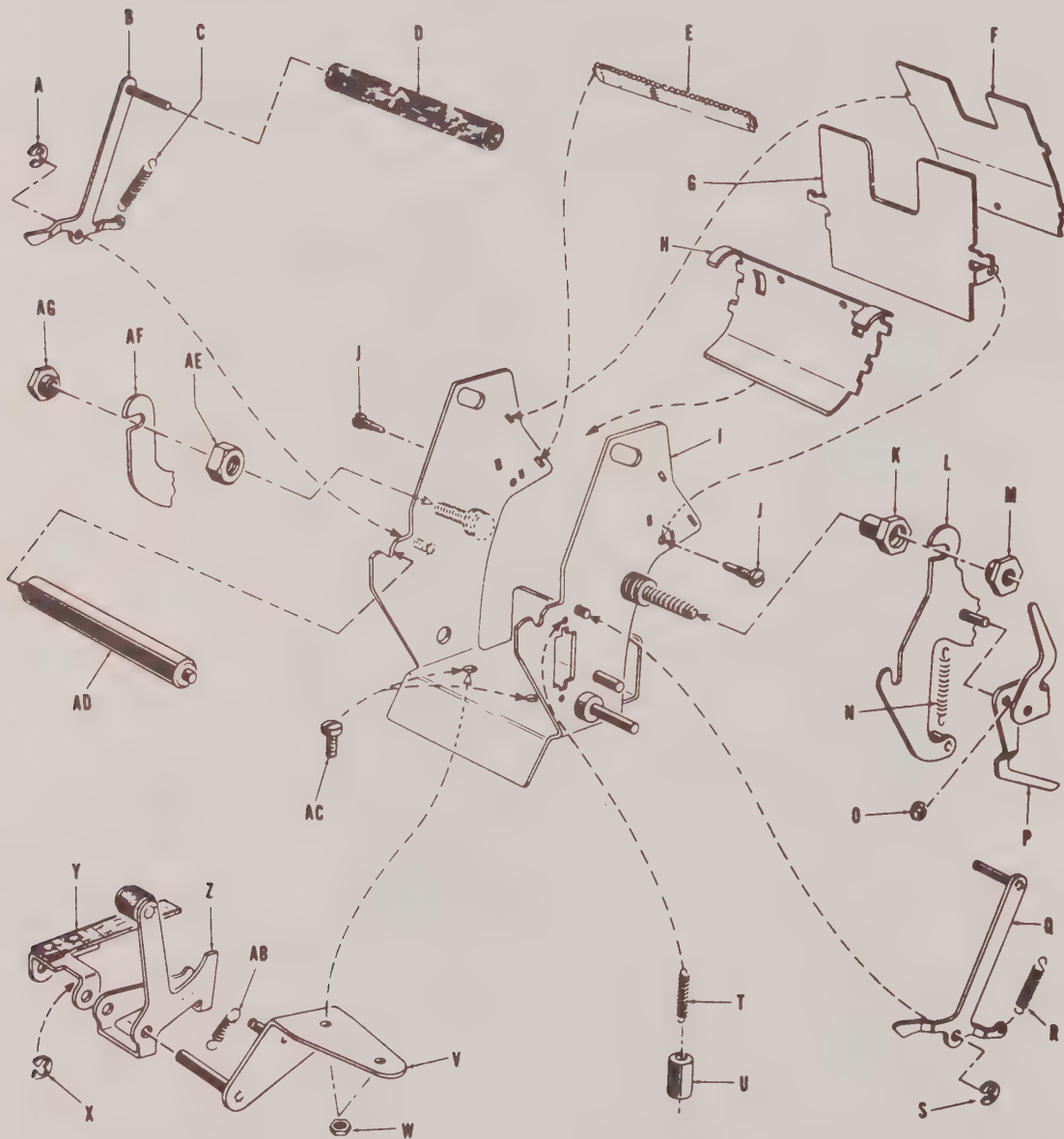
NOTE: 2JC15-1 complete Roll Paper Holder
 2JC15-2 before complete Roll use (2) 72629
 J121885D Paper Holder screws and
 2JC15-3 after for J289 X30-41, X30-42
 J121884D machines nuts
 3JC117 complete Assembled Carriage
 3JC117-1 complete Assembled Carriage for J289 machines

A	JC5-1 roll paper shaft	AS	Use JC4-5, JT5-5 shaft
B	1JC15-8 before } J121885D } paper holder frame 1029 0955 after } J121884D }		& 12051 ^{3/4} screws on macha. between J56296D & J100944D pressure JC4-5 used on machs. roll release after J100943D bail shaft JC4-1 used on machs. prior to removable platen
C	JC26-2 guide plate	AT	20 No. 73A spring anchor, for J289 only
D	JC16-1 tear-off blade	AU	X80-23 spring
E	X60-34 screw	AV	1JC12-1 ratchet
F	72524 spring	AW	1JC22-7 platen end plate
G	X30-42 lock nut	AX	7787 spring
H	X30-47 adjusting nut	AY	2JC117-11 right side frame
I	X133-105 clip	AZ	83906B spring
J	JC28-3 latch	BB	JX40 eccentric collar
K	X80-24 spring	BC	X80-282 screw
L	1JC50-1 arm	BD	JC3-1 tie shaft
M	86803 No. 3 spring	BE	JC21 grooved spring shaft
N	JX64 limit bushing	BF	12083 spring
O	JC49 paper metering roll	BG	2JC117-5 used from J56297D to J74502D left side 2JC117-13 used after frame J74501D
P	JC16-2 tear-off blade		2JC117-12 for J289 machs.
Q	1JC26 guide plate, use 44506 screws	BH	45 ^{1/4} hex. nut
R	1JC50 arm	BI	X275-23 lockwasher
S	JC28-2 latch	BJ	2JD85-5 before J136987D other 2JD85-6 between than J136986D & J289-90- J178632D 91 92 cge. 2JD85-10 after restor- J178631D ing arm 1JD85-4 before Styles J178632D J289-90- 1JD85-7 after 91 92
T	X60-132 screws	BK	JD156 before J115953D } shoulder screw 405533 after J115952D }
U	JC30 pressure plate guide bracket	BL	1JC13-1 shown spacing pawl, 1JC13 for J289 use 82803 spring machines
V	JX2-1 compression springs	BM	613 ^{1/2} washer
W	JC29-2 pressure plate	BN	JD129 adjusting link
X	Use 1JC15-9 paper holder frame and JC29-2 pressure plate on machs. be- fore J130800D 1JC15-9 paper holder frame on machs. after J130799D	BO	JC47 eccentric screw
Y	1JC23 safety switch bellcrank	BP	JX14 spacer, for J289 only
Z	705811 spring	BQ	JC16-1 platen space ratchet
AB	1JC24 safety switch bail	BR	JC83 spring
AC	21 No. 26 clip		
AD	JC19 pressure roll		
AE	76806 spring		
AF	JC2-1 eccentric tie shaft, use 46 ^{1/4} nuts		
AG	JC6 pressure roll shaft		
AH	1JC1-2 platen assembly		
AI	JC16-2 platen star wheel		
AJ	JX39 set screw		
AK	JX13 spacer, for J289 only		
AL	JX12 spacer, for J289 only		
AM	X81-7 flat retainer spring, included in AN		
AN	1JC20-6 shown } platen twirler 1JC20-7 Series J 400 }		
AO	1JC7-6 shown } paper guide 1JC7-7 Series J 400 }		
AP	1JC35 carriage pivot		
AQ	1028 4164 pressure roll release bail, after J217188D use 1028 4164 bail and 1028 4065 plug before J217189D		
AR	JC10 pressure roll arm		

BURROUGHS—SERIES J PARTS CATALOG

Carriages

ROLL PAPER HOLDER, SERIES J400 (PLATE 2-1)



PART NUMBERS ON NEXT PAGE

BURROUGHS—SERIES J PARTS CATALOG

Carriages

PART NUMBERS (PLATE 2-1)

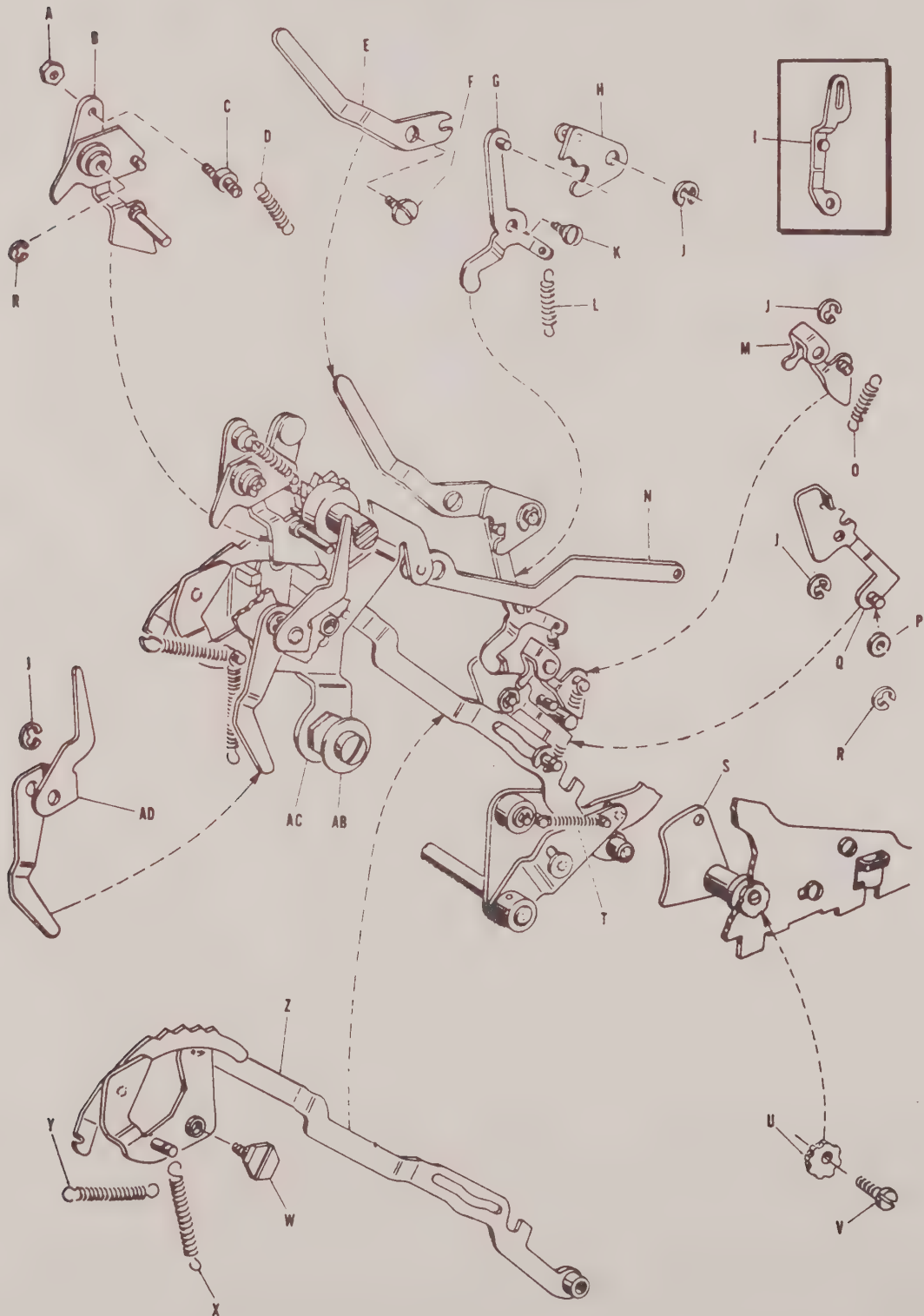
NOTE: 1029 7810 complete assembled paper holder

- A X133-105 clip
- B Use 1JC50-6 arm (right), 1JC50-7 arm (left)
and (2) 74815 springs before J 209601D
1JC50-6 idler arm (right) after J209600D
- C 99802 No. 2 spring
- D JC49 paper metering roll
- E JC16-2 tear-off blade
- F 1029 9618 paper guide plate
- G Use JC26-5 plate, 1029 5830 paper holder, 1JC50-6
arm (right) and 1JC50-7 arm (left) before J209601D
JC26-5 paper guide plate after J209600D
- H 1JC7-7 paper guide pan
- I Use 1029 5830 paper holder, JC26-5 plate, 1JC50-6,
arm (right), 74815 (2 reg.) and 1JC50-7 arm
(left) before J209601D
1029 5830 roll paper holder after J209600D
- J JX218 screw
- K JX64 lock nut
- L 1JR110 15 left side frame, ribbon assembly
- M X30-47 adjusting nut
- N 7283A Style 10 spring
- O 21 No. 32 clip
- P JR22 restoring arm, use 283A spring & 20 No. 108
spring anchor
- Q Use 1JC50-7 arm (left), 1JC50-6 arm (right) and (2)
74815 springs before J209601D
1JC50-7 idler arm (left) after J209600D
- R 10082 1/2 spring
- S X133-105 clip
- T 60807 spring
- U JC29-4 pressure roll
- V 1JM51 bracket, before J209601D
- W 46 1/8 nut, before J209601D
- X 21 No. 26 clip
- Y 1JC24 safety switch ball
- Z 1JC23-1 safety switch bellcrank
- AB 702806 spring
- AC 79510 screw, before J209601D
- AD JC5-1 paper shaft
- AE X30-42 lock nut
- AF 1JR110-14 right side frame, ribbon assembly
- AG X30-47 adjusting nut

BURROUGHS—SERIES J PARTS CATALOG

Carriages

PLATEN SPACING, 5/6" (Plate 3)



PART NUMBERS ON NEXT PAGE

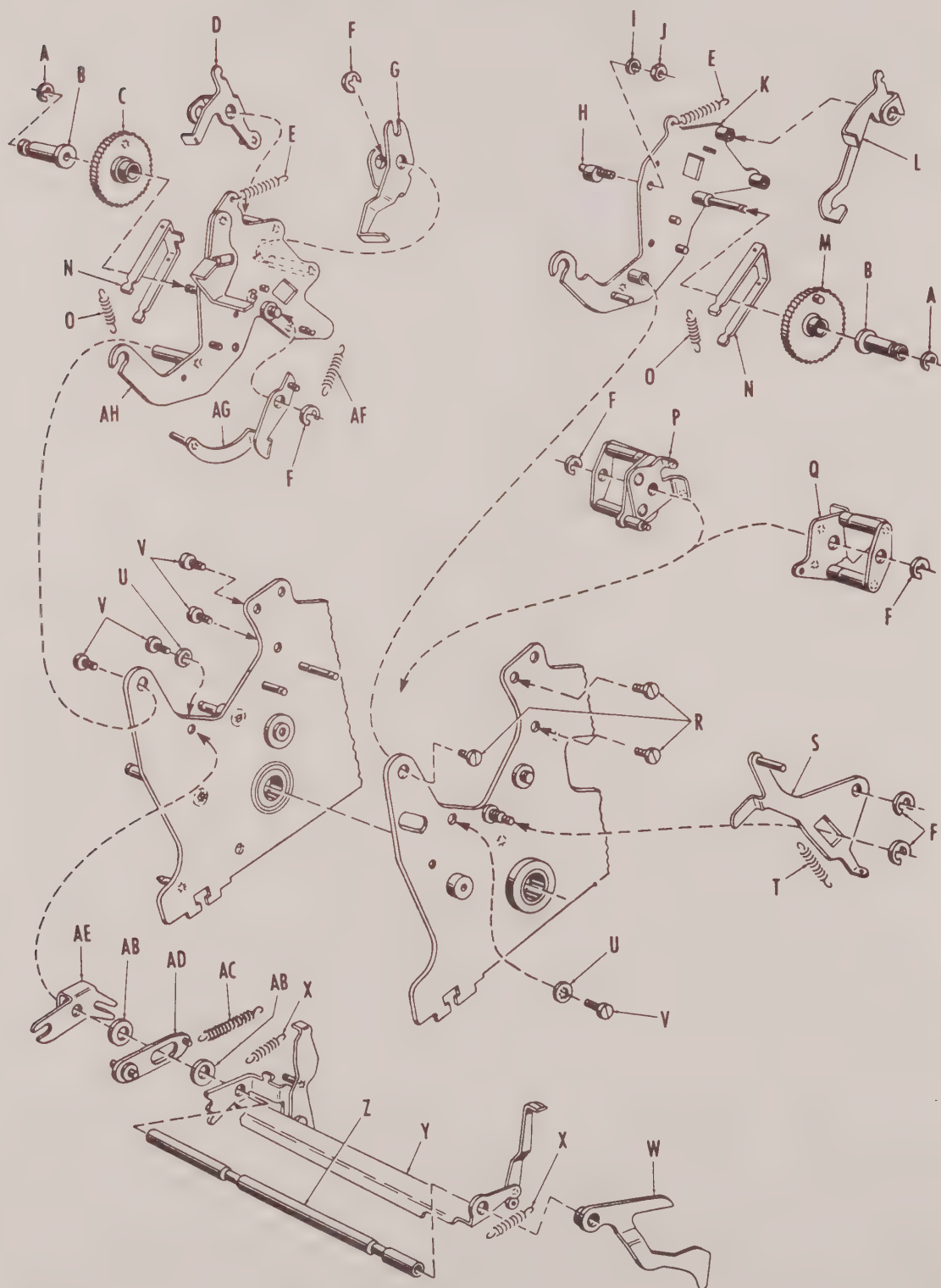
BURROUGHS—SERIES J PARTS CATALOG

Carriages

PART NUMBERS (Plate 3)

A	46 $\frac{1}{2}$ hex. nut	
B	2JC55 detent driver assembly	
C	JX65 eccentric screw	
D	JX257 spring	
E	JT64 normalizing lever	
F	X60-132 screw	
G	1JT63-1 shown, after J66358D	} lever
	1JT63 before J66359D	
H	1JT53 space detent	
I	1JD127 link, before J66359D	use
	X133-105 clip	
J	X133-107 clip	
K	81503 $\frac{1}{2}$ screw	
L	79810 spring	
M	1JT54 selector arm	
N	JT33-1 shown, after J56296D	} feed pawl control link
	JT33 before J56297D	
O	89806 spring	
P	X10-309 washer	
Q	1JT62 use before machine J66359D	} selector arm
	1JT62-2 use after machine J66358D	
R	X133-105 clip	
S	1JD128-1 disengaging cam	
T	84818 spring	
U	X57-6 eccentric	
V	2854 $\frac{1}{4}$ screw	
W	JC40 screw	
X	9086 spring	
Y	3280 $\frac{1}{4}$ spring	
Z	2JC33-5 shown, after J66358D	} spacing sector
	2JC33-4 before J66359D	
AB	JC47 eccentric screw, use 613 $\frac{1}{4}$ wash- er	
AC	1JC13-1 shown, after J56296D	} spacing pawl
	1JC13 before J56297D, also J289 machines	
AD	JR22 restoring arm	

RIBBON FEED MECHANISM (Plate 4)



PART NUMBERS ON NEXT PAGE

BURROUGHS—SERIES J PARTS CATALOG

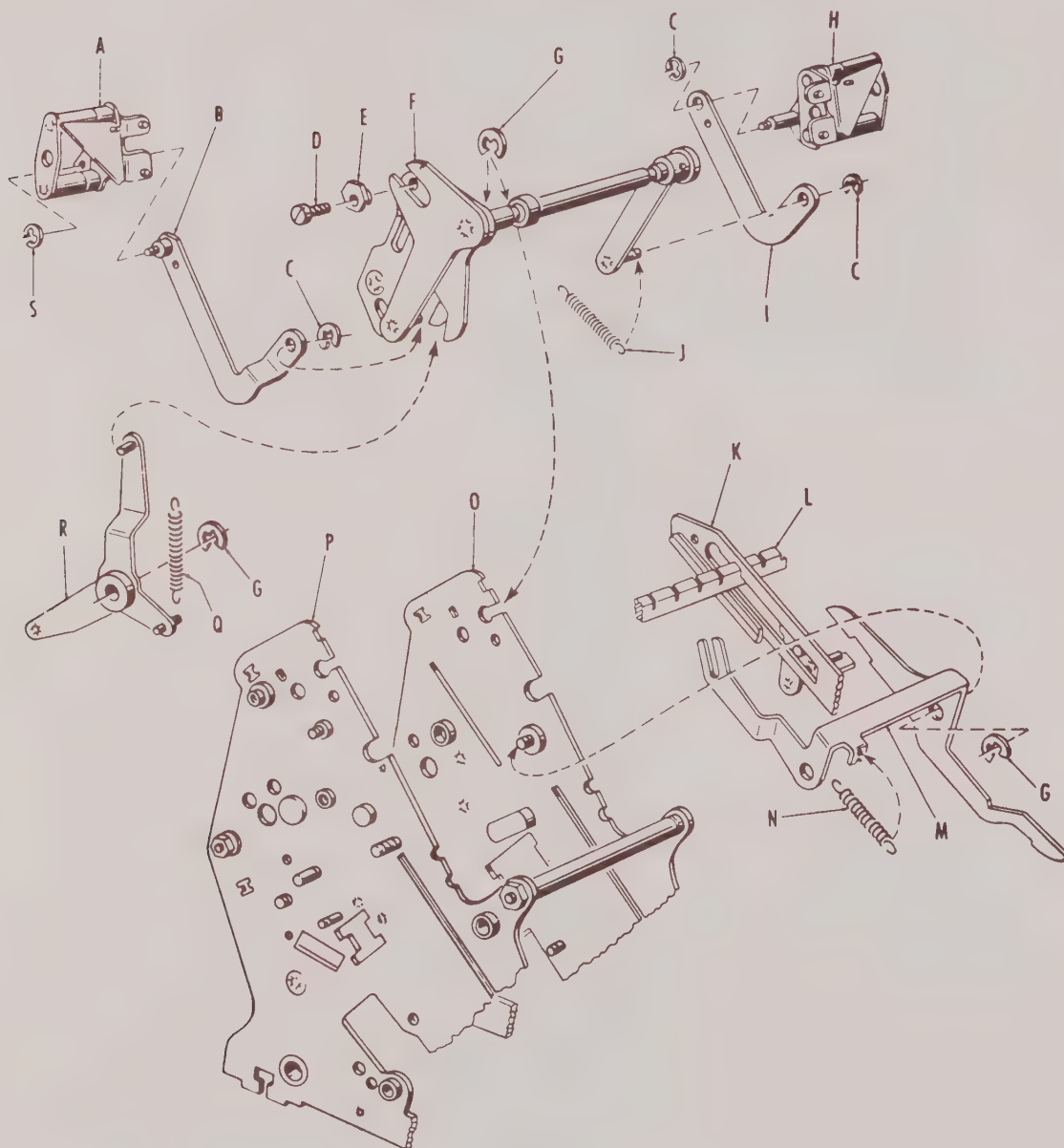
Carriages

PART NUMBERS (Plate 4)

A	X133-105 clip	
B	JR17 shown	} ribbon spool bearing
	X10-67 for J289 machines	
C	1JR9 right ratchet wheel	
D	1JR4-2 shown, after J56296D	} ribbon ratchet pawl
	1JR4 before J56297D	
E	3480 1/2 spring	
F	21 No. 26 clip	
G	JR5-1 shown, after J56296D	} pawl latch
	JR5 before J56297D	
H	JR20 eccentric screw	
I	X275-5 lockwasher	
J	46 nut	
K	1JR110-1 before J56297D	} left side frame
	1JR110-7 after J56296D	
	1JR110-8 before J121885D	} Style J289 left side frame
	1029 0930 after J121884D	
	1JR110-15 for Series J 400	
L	JR4-3 shown, after J56296D	} ribbon ratchet pawl
	JR4-1 before J56297D	
M	1JR9-1 left ratchet wheel	
N	JR10 flat brake spring	
O	83822 spring	
P	Use 1JR11-9 guide, 1JT61-4 link and 21 No. 24 clip on machs, before J133838D	} see Plate 6 for other styles
	1JR11-9 guide, after J133837D	
Q	1JR11-8 left ribbon guide	
R	X60-242 screw	
S	1JR16-4 shown, after J56296D	} ribbon tension arm
	1JR16 before J56297D	
T	89806 spring	
U	1097 1/4 lockwasher	
V	X60-31 screw	
W	1JD138 restoring arm	
X	77802 spring on right	
	707800 spring on left	
Y	1JR6 before J56297D	} ribbon reverse bail
	1JR6-1 after J56296D	
	1JR6-2 for J289 machs. after J121884D	
Z	JB2-2 ribbon reverse bail shaft	
AB	127 fte. 213 washer	
AC	803 fte. 219 shown. spring	
	JX214 spring, use 79145 ring for Series J 400 machs.	
AD	1JR6 ribbon reverse detent	
AE	JR7 shown, before J121885D	} ribbon reverse lever
	JR7-1 after J121885D	
AF	71803 spring	
AG	1JR16-2 ribbon tension arm	
AH	2JR110 before J56297D	
	Use 1028 4156 sideframe. 1028 4164 pressure roll release bail & 1028 4065 plug between J56296D & J213036D	} right side frame
	Use 1028 4156 sideframe after J213035D	
	Use 1028 4149 sideframe. 1028 4164 pressure roll release bail & 1028 4065 plug before J217189D	} Style J289 right side frame
	Use 1028 4149 sideframe after J217188D	

Carriages

RIBBON SHIFTING MECHANISM (Plate 5)



PART NUMBERS (Plate 5)

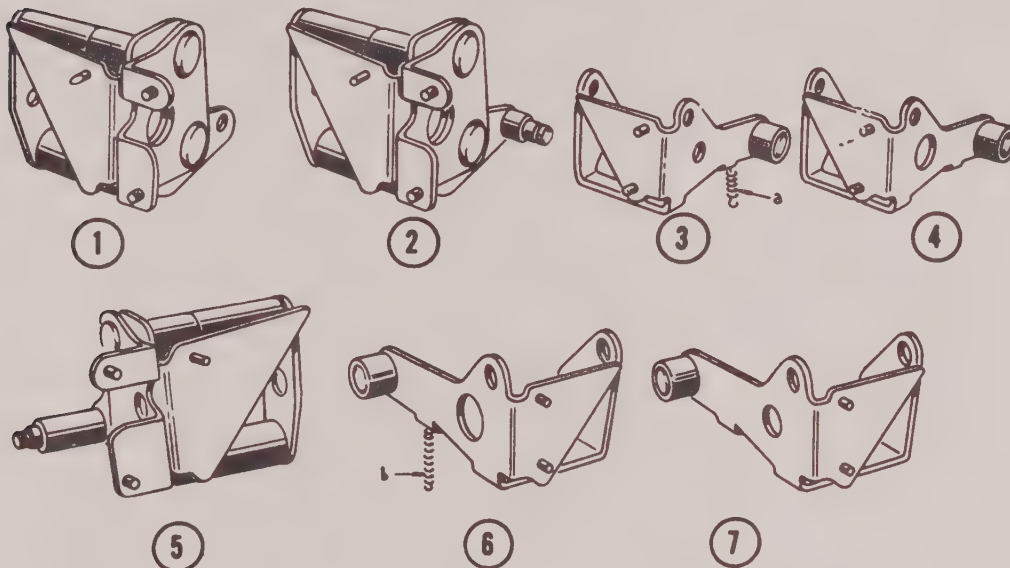
- A 1JR11-8 left ribbon guide, see Plate 6,
for other styles
B 1JT61-3 shown, } link
after J74501D
JT61-1
before J74502D
C X133-105 clip
D 84631 1/4 screw
E X10-30 eccentric bushing
F 1JT55 shaft assembly
G 21 No. 26 clip
H Use 1JR11-9 guide, 1JT61-4 link and
21 No. 24 clip on machs. before
J133838D
1JR11-9 right ribbon guide after
J133837D
See Plate 6, for other styles
I Use 1JT61-4 link, 1JR11-9 guide and
21 No. 24 clip on machs. before
J133838D
1JT61-4 link, after J133837D

- J 74809 No. 1 spring
K Use 1JT118-65 & JT60-3 on machs.,
before J147951D
1JT118-65 symbol bar on machs.,
after J147960D
See Plate 19, for other styles
L JT16-1 type bar guide
M JT60-3 selector bail
N X80-24 spring
O 1JT110-11 right adding } see Plate 16,
section frame } for other
P 1JT110-6 left adding } styles
section frame
Q 69801 spring
R 1JD130 (shown) before } power
J178632D } arm
1JD130-1 after
J178631D
S 21 No. 24 clip

BURROUGHS—SERIES J PARTS CATALOG

Carriages

RIBBON GUIDE CHART (Plate 6)

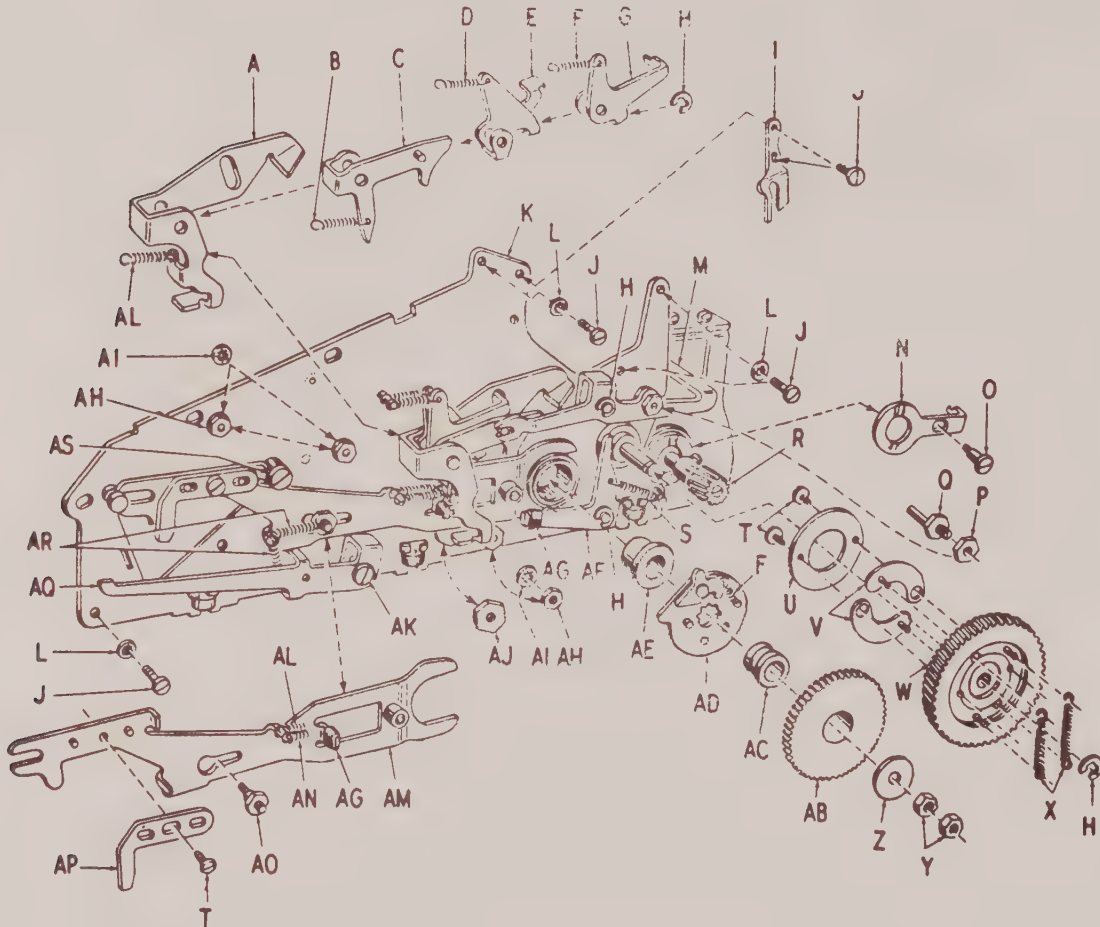


PART NUMBERS (Plate 6)

REF.	DESCRIPTION	PART NUMBER
1	Left guide for machines after J74501D	1JR11-8
2	Left guide for machines between J56296D and J74502D	1JR11-4
3	Left guide for machines before J56297D	1JR11-1
4	Left guide for Style J289 machines	1JR11-5
5	Right guide, used on machs. after J133838D	1JR11-9
	Parts on machs. before J133837D are as follows:	
	1JR11-9, 1JT61-4 and 21 No. 24	
6	Right guide for Style J289 machines	1JR11-6
7	Right guide for machines before J56297D	1JR11
a	Spring for guides Nos. 3, 4, & 7	2887½
b	Spring for guide No. 6	53804

Side Frames

RIGHT SIDE FRAME ASSEMBLY (OUTER VIEW) (Plate 10)



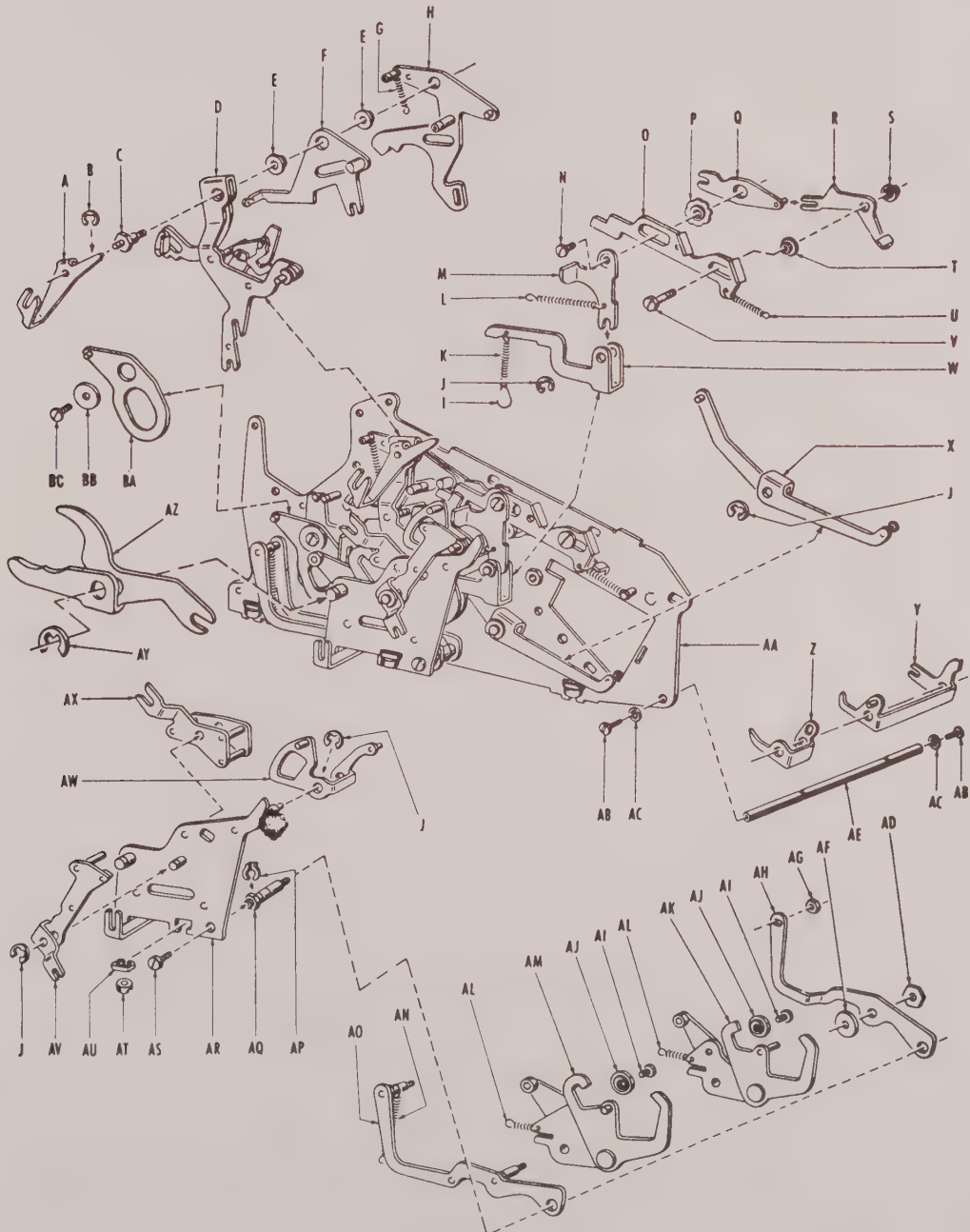
PART NUMBERS (Plate 10)

- | | | | |
|---|---|----|--|
| A | JD18 clutch release arm | W | 1JD57-1 gear assembly only |
| B | 79824 spring | | 2JD57-1 complete safety clutch gear assembly, includes T, U, V, W, X |
| C | 1JD61-4 retaining arm for switch points | X | X80-56 springs |
| D | 10686 1/4 spring | Y | X30-6 hex. nut |
| E | JD63 latch for total lever | Z | X1-12 washer |
| F | 83802 spring | AB | 1JD4 drive clutch gear |
| G | JD19 latch for subtract lever | AC | X10-50 bushing |
| H | 21 No. 26 clip | AD | 2JD3 cam for restoring drive trip |
| I | JD126 guide | AE | X10-49 bushing |
| J | X60-31 shown. screw | AF | JD59 detent |
| K | JX262 screw, use JX263 rubber collar, Series J 490 for other styles | AG | X95-5 rubber bumper |
| L | 1097 1/4 lockwasher | AH | 45 1/2 nut |
| M | 1JD55-1 shown, machs with J or J2 mtrs. } switch arm | AI | X275-23 lockwasher |
| N | JM24 bearing retainer | AJ | 203446 No. 2 shoulder nut |
| O | X60-117 shoulder screw | AK | X30-4 threaded bushing, use 10025 1/4 No. 3 washer |
| P | X30-28 nut | AL | 72826 spring |
| Q | 1026 4257 eccentric screw | AM | 1JD16 drive trip slide |
| R | JD54 pinion gear, use JX39 set screw | AN | X80-71 spring |
| S | 69807 Style 13 spring | AO | X52-10 hex. head spring stud |
| T | 702655 screw | AP | JD84 adjustable stop arm |
| U | No longer required, use ref. T | AQ | JD17 latch for drive trip slide |
| V | 1JD86 arm | AR | 63800 spring |
| | | AS | X60-32 shoulder screw, use 1029 5145 rubber bumper |

BURROUGHS—SERIES J PARTS CATALOG

Side Frames

RIGHT SIDE FRAME ASSEMBLY (INNER VIEW) (Plate 11)



PART NUMBERS ON NEXT PAGE

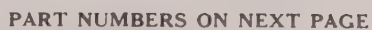
BURROUGHS—SERIES J PARTS CATALOG

Side Frames

PART NUMBERS (Plate 11)

A	JD53 symbol indexing arm
B	X133-105 clip
C	X60-41 hex. spring stud
D	2JD42-1 shown, with minus bal. } secondary
	1JD42-1 without minus bal. before J20726D } total
	1JD42-2 without minus bal. after J20726D } lever
E	X10-61 flanged collar
F	1JD41 primary total lever
G	480 $\frac{1}{4}$ spring
H	1JD40 listing lever
I	29 No. 73A spring anchor
J	21 No. 26 clip
K	X80-29 spring
L	8T814 spring
M	JD80 keyboard support
N	X60-35 screw
O	JD33 interlock slide
P	JD89 eccentric shoulder collar
Q	1JD26 secondary minus lever
R	JD24 primary minus lever
S	X10-63 double flanged collar
T	X10-62 shoulder collar
U	483 spring
V	X60-42 screw
W	JD81 centralizer
X	1JD23 intermediate keyboard shutter disabling lever
Y	1JD28 interlock bail
Z	JD28-1 bail to disable intermediate keyboard shutter
AA	1JB110 right side frame assembly, see Plate 15, for other styles
AB	X60-31 screw
AC	1097 $\frac{11}{16}$ lockwasher
AD	203446 No. 2 hex. nut
AE	JB2-2 tie shaft
AF	FC320 brass space washer
AG	46 $\frac{1}{4}$ nut
AH	JD82 safety arm
AI	X60-40 screw
AJ	X10-60 eccentric
AK	2JD8 listing hook
AL	10734 spring
AM	2JD8-1 total hook
AN	X80-46 spring
AO	1JD83 safety arm
AP	21 No. 10 clip
AQ	X45-33 hex. headed post
AR	2JD21-1 auxiliary side frame
AS	X60-157 screw
AT	82300 slotted nut
AU	82107 $\frac{1}{4}$ clip
AV	1JD52-2 shown, } minus bal. } total
	1JD52 before J20726D } lever
	1JD52-1 without minus bal. } block
AW	1JD39 subtract symbol indexing lever
AX	1JD11 accumulator meshing cradle
AY	X5-6 clip
AZ	JD27 cipher block lever
BA	1JB13-1 ribbon feed lever
BB	X1-32 flat washer
BC	73612 screw

RIGHT SIDE FRAME ASSEMBLY—STYLE 3 (OUTER VIEW) (Plate 12)



BURROUGHS—SERIES J PARTS CATALOG

Side Frames

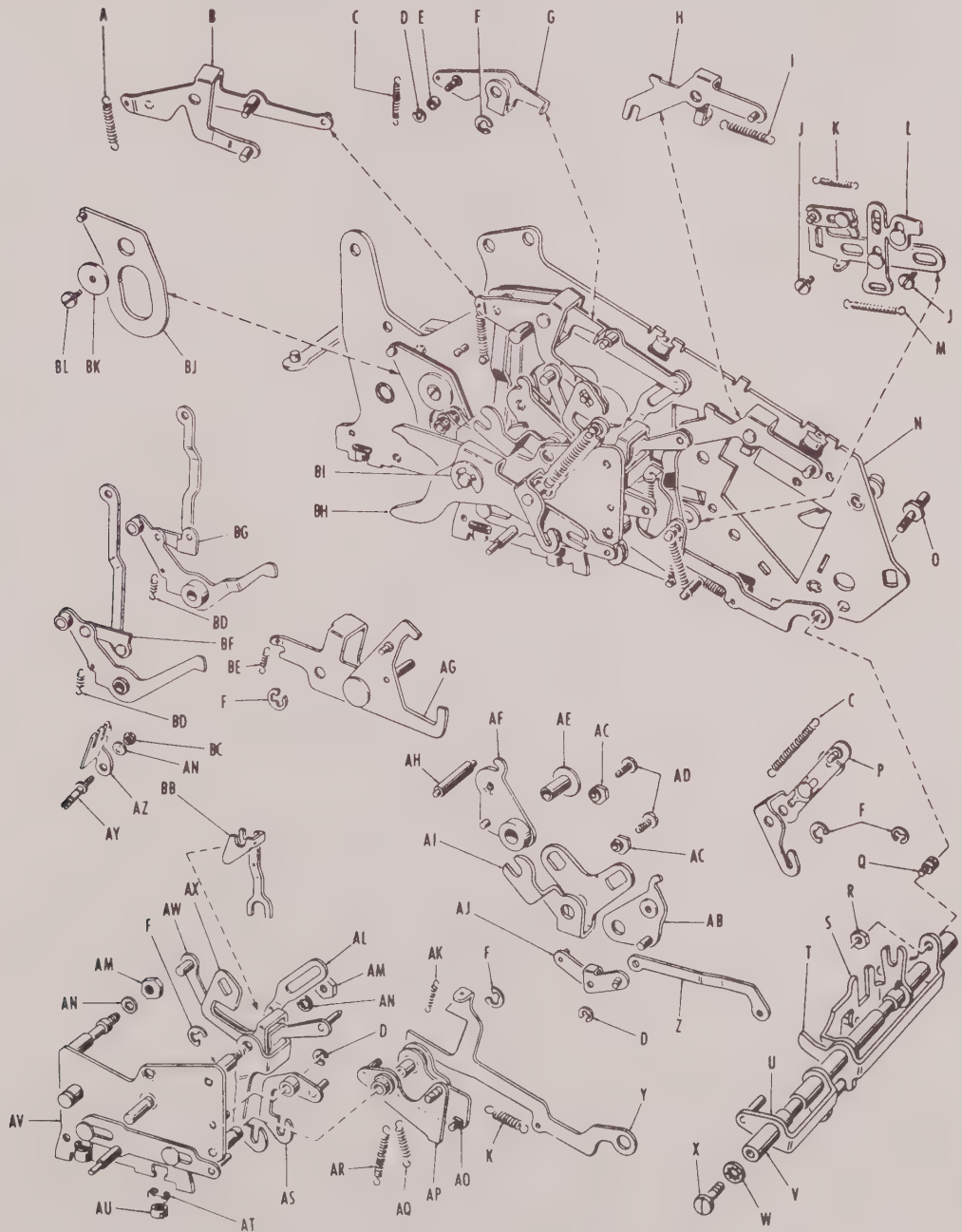
PART NUMBERS (Plate 12)

A	1JD16-3 shown	} motor trip slide
	1JD16-6 Series J 400	
B	JD139 eccentric	
C	46 nut	
D	1JD118-2 plate	
E	JD165 spring post	
F	JD140 screw	
G	45 1/4 nut, use X275-23 lockwasher	
H	JD126 guide	
I	X60-31 screw	
J	72828 spring	
K	X95-5 rubber bumper	
L	21 No. 26 clip	
M	1JD59-1 detent	
N	69807 Style 13 spring	
O	988 spring	
P	1JD61-4 switch timer	
Q	1029 0799 clutch dog stop	
R	72828 spring	
S	1JD55-1 shown, mchs. with J or J2 motors	} switch arm
	1JD55-4 mchs. with J3 motors	
T	1026 4257 eccentric screw	
U	X30-28 nut	
V	See Plate 15	
W	82300 slotted nut, use 82107 1/4 clip	
X	702655 screw	
Y	No longer required, use Ref. X	
Z	1JD86 arm	
AB	1JD57-1 gear assembly only	
	2JD57-1 complete gear & safety clutch includes X, Y, Z, AB & AC	
AC	X80-56 spring	
AD	X30-6 hex. nut	
AE	X1-12 washer	
AF	1JD4 drive clutch gear	
AG	X10-50 bushing	
AH	2JD3 cam for restoring drive trip	
AI	83802 spring	
AJ	X10-49 bushing	
AK	X60-34 screw, use 1097 13/16 lockwasher	
AL	Use 1JD17-3 motor trip slide, 1JD16-3 slide, JX82 spring anchor, 84813 spring, 3688 spring, 1JK53-2 slide, JK15-2 arm and 780 (2 carbon) spring before J99431D	
	1JD17-3 motor trip slide after J99430D	
AM	46 nut	
AN	X275-23 lockwasher	
AO	JK15-2 arm, use 780 (2 carbon) spring	
AP	1JK53-2 trip slide	
AQ	99573 screw	
AR	1046 1226 hex post	
AS	JD124 lock hook	
AT	Use 1JD17-3 motor trip slide, 1JD16-3 slide, JX82 spring anchor, JB38 screw, 3688, 84813 and 1026 4414 springs	
AU	83800A spring	
AV	X133-105 clip	
AW	3486 1/2 spring	
AX	406301 eccentric	
AY	83639 screw	
AZ	10085 spring	
BB	Use 1029 0773 driver, 20 No. 102 spring anchor, 3486 1/2 spring, 3688 spring, X57-7 eccentric, 1029 0799 clutch dog, 72828 spring (2 req.), 72806 spring and 1029 0781 right sideframe before J212387D	
	1029 0773 driver after J212386D	
BC	JD142-1 threaded post	
BD	72806 spring	
BE	2854 3/16 screw, use 20 No. 102 spring anchor	
BF	X57-7 eccentric	

BURROUGHS—SERIES J PARTS CATALOG

Side Frames

RIGHT SIDE FRAME ASSEMBLY—STYLE 3 (INNER VIEW) (Plate 13)



PART NUMBERS ON NEXT PAGE

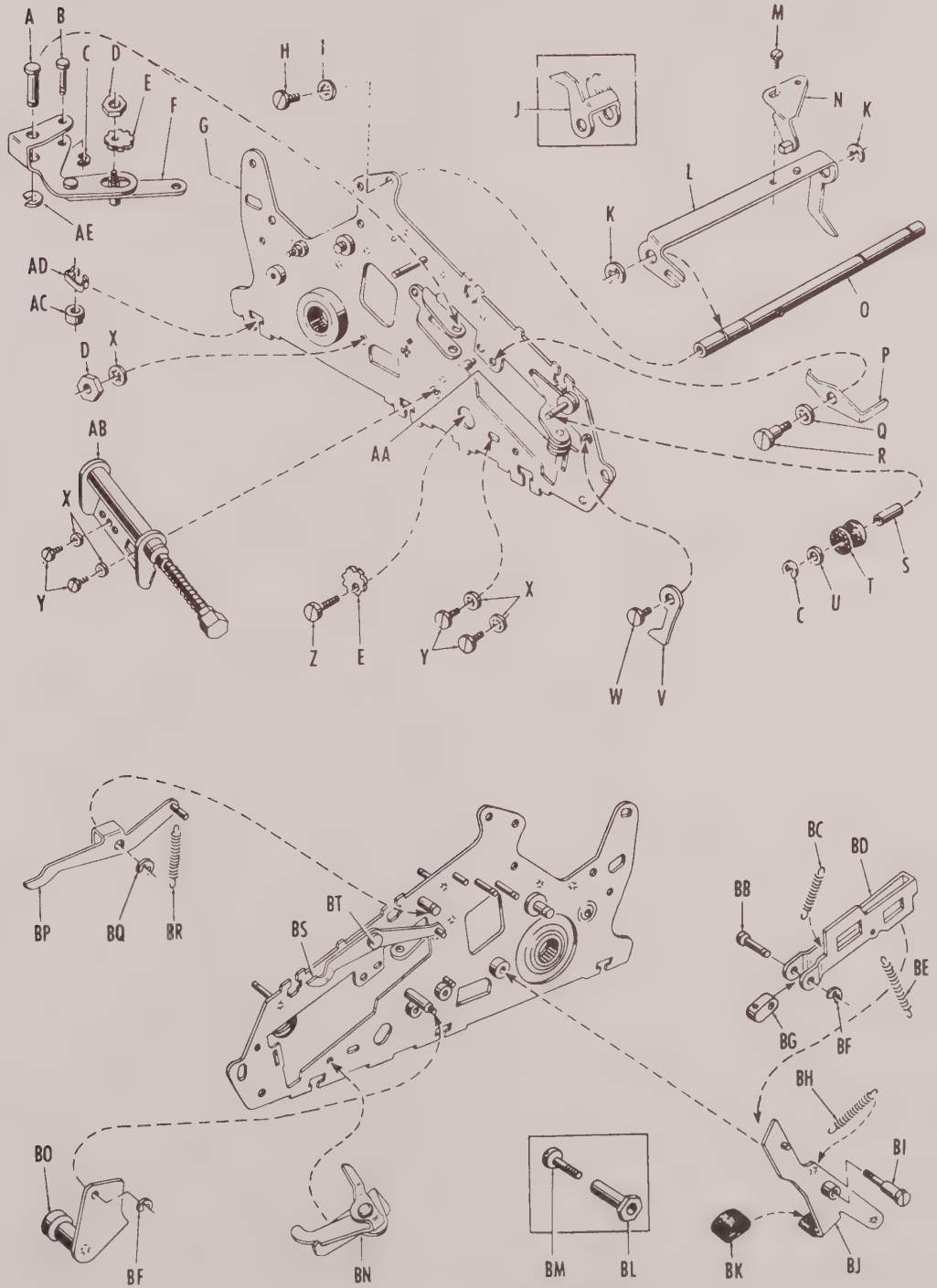
BURROUGHS—SERIES J PARTS CATALOG

Side Frames

SYMBOL NUMBERS (Plate 13)

A	480B spring	
B	1JD121 before J99944D	} total control bail
C	1JD121-1 after J99943D	
D	15805 spring	
E	X133-105 clip	
F	9835 roller	
G	21 No. 26 clip	
H	1JD122 list control bail	
I	1JD120 shown	} subtract index
J	1JD120-2 Series J400/lever	
K	10085 spring	
L	X60-236 screw	
M	10180 spring	
N	1JD107 minus index link	
O	10686 1/2 spring	
P	See Plate 15, for other styles	
Q	1046 1226 hex post	
R	2JD52-4 minus balance lever	
S	JD145-1 eccentric screw	
T	46 1/4 nut	
U	1JD125 keyboard interlock bail	
V	JD28-3 shutter lift bail	
W	1JD153 shown, use before	} bail assembly
X	machs J103280D	
Y	1JD153-2 use after machs	
Z	J103279D	
AB	JB2-2 shaft	
AC	1097 1/4 lockwasher	
AD	X60-31 screw	
AE	JD113 shown, used before	} shutter lift arm
AF	J57224D and after	
AG	J63447D	
AH	JD113-1 used between	
AI	J57223D and J63448D	
AJ	JD115 link	
AK	1JD104 minus cradle arm	
AL	X57-20 eccentric	
AM	X60-36 screw	
AN	X10-250 bushing	
AO	1JD104-1 plus cradle arm	
AP	1JD97-1 cradle hook	
AQ	JD96 post	
AR	JD119-1 accumulator mesh cradle	
AS	1JD114 subtract index bellcrank	
AT	10784 spring	
AU	JD105 shutter index arm	
AV	45 1/4 nut	
AW	X275-23 lockwasher	
AX	2JD23-3 yielding joint assembly	
AY	1JD111-2 shutter lift control	
AZ	X80-17 spring	
BA	480 1/4 spring	
BB	1JD112 arm	
BC	82107 1/4 clip	
BD	82300 slotted nut	
BE	1026 4398 aux. side frame assembly	
BF	1JD106 minus index bail	
BG	JD116 minus balance bellcrank	
BH	JD95 spring anchor screw	
BI	JD110 guide	
BJ	JD157 support	
BK	46 nut	
BL	10784 spring	
	205806 spring	
	2JD99-1 total driver arm	
	2JD99 listing drive arm	
	JD27-1 shown, before machs	} cipher block lever
	J100031D	
	JD27-2 after machs J100029D	
	X5-6 c lip	
	1JB13-1 ribbon feed lever	
	X1-32 washer	
	73612 screw	

LEFT SIDE FRAME ASSEMBLY (OUTER) AND (INNER) VIEW (Plate 14)



SYMBOL NUMBERS ON NEXT PAGE

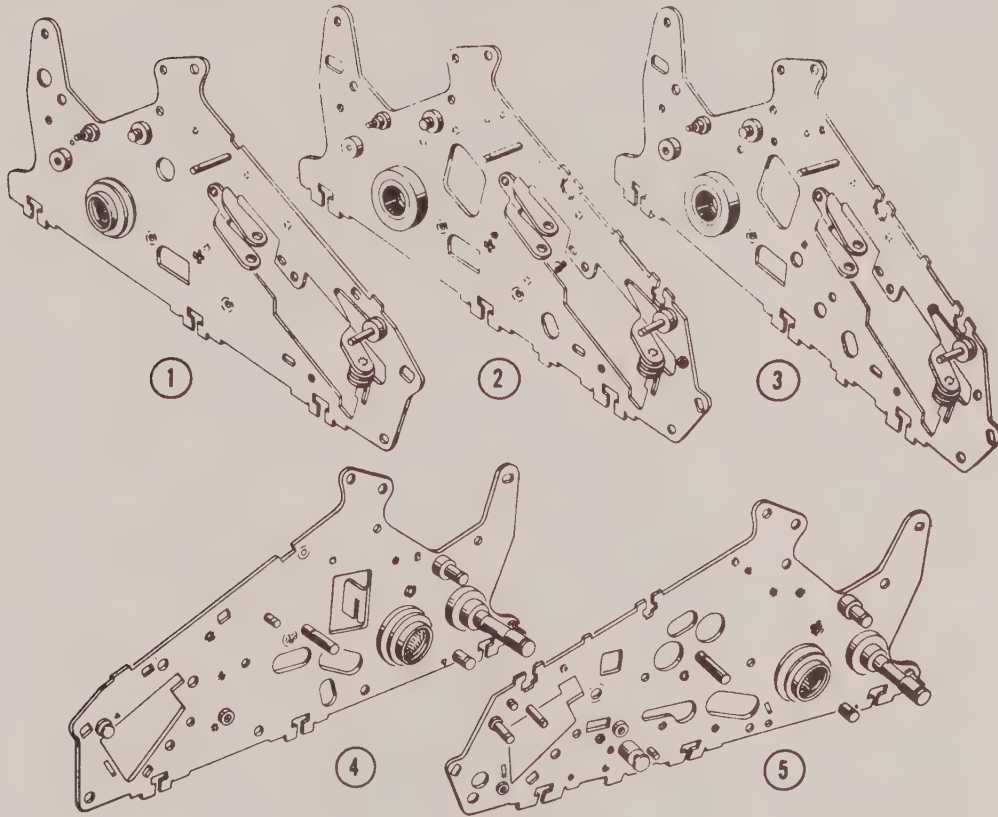
BURROUGHS—SERIES J PARTS CATALOG

Side Frames

PART NUMBERS (Plate 14)

A	X50-146 pivot pin	
B	X51-100 universal pivot pin	
C	X133-105 clip	
D	45 $\frac{1}{4}$ hex. nut	
E	X57-4 eccentric	
F	1JD64-1 shown, intermediate key-board restoring arm for Style 215 thru 224	
	1JD64-3 intermediate keyboard restoring arm for Style J289, use	
	JX189 rubber bumper	
G	Use 1JB110-18, 1JD43-4, JX253, 1JD3-43, JD3-42, 45 1/4, X275-4, X10-359, JX244, X10-358, JX224, 1JD130-1, 2JD85-8, 2JC117-13 and JB21-17 before J178632D	
	1JB110-18 left sideframe after J178631D	
	See Plate 15, for other styles	
H	X60-31 shown, screw	
	JX261 screw, use JX263 rubber collar - Series J 400	
I	1097 $\frac{15}{16}$ lockwasher	
J	JR15 cam bail for non add symbol before J56297D	
K	X5-6 clip	
L	1JD36-2 shown, after J56296D	} non add bail
	1JD36 before J56297D	
M	X60-35 screw	
N	1JD154-1 arm	
O	JB11-1 shown, after J56296D	} tie shaft
	JB11 before J56297D	
	JB11-3 Series J400	
P	JS9-2 left limit stop	
Q	1097 $\frac{15}{16}$ lockwasher	
R	JX57 screw	
S	X10-131 (.200 O.D.)	} bushing
	X10-231 (.250 O.D.)	
T	JB14 rubber cushion only	
	1JB14 with X10-131 bushing (.200 O.D.)	} rubber cushion
	1JB14-1 with X10-231 bushing (.250 O.D.)	
U	200162 $\frac{1}{4}$ washer	
V	JD124 lock hook	
W	99573 screw	
X	X275-23 lockwasher	
Y	X60-36 screw	
Z	2854 $\frac{1}{4}$ screw	
AA	JB24 pulley, use 83515 $\frac{1}{2}$ screw, 48 $\frac{1}{4}$ nut—for field replacement only	
AB	1JD70 air pot assembly	
AC	82300 slotted nut	
AD	82107 $\frac{1}{4}$ clip	
AE	21 No. 26 clip	
BB	X51-100 universal pivot pin	
BC	X80-24 spring	
BD	1025 3565 intermediate keyboard restoring link	
BE	3280 $\frac{1}{4}$ spring	
BF	X133-105 clip	
BG	JD78 before J190178D	} universal
	JD78-1 after J190177D	
BH	89806 spring	
BI	JX253 shoulder screw	
BJ	1JD43 before J56297D	} intermediate keyboard restoring lever
	1JD43-1 (shown) between J56296D & J178632D	
	1JD43-4 after J178631D	
	1029 5145 rubber bumper	
BK	1029 5145 rubber bumper	
BL	JD236 shoulder nut	} used for repairs when replacing BJ
	73659 screw	
BM	73659 screw	
BN	1JD76 air pot arm	
BO	1JD126-1 disengaging cam	
BP	1JD35-1 non add key lever	
BQ	21 No. 26 clip	
BR	8381 spring	
BS	1JB20-1 shown	} repeat key lever
	1JB20-2 Series J400	
BT	X50-99 rivet	

MACHINE SIDE FRAMES (Plate 15)

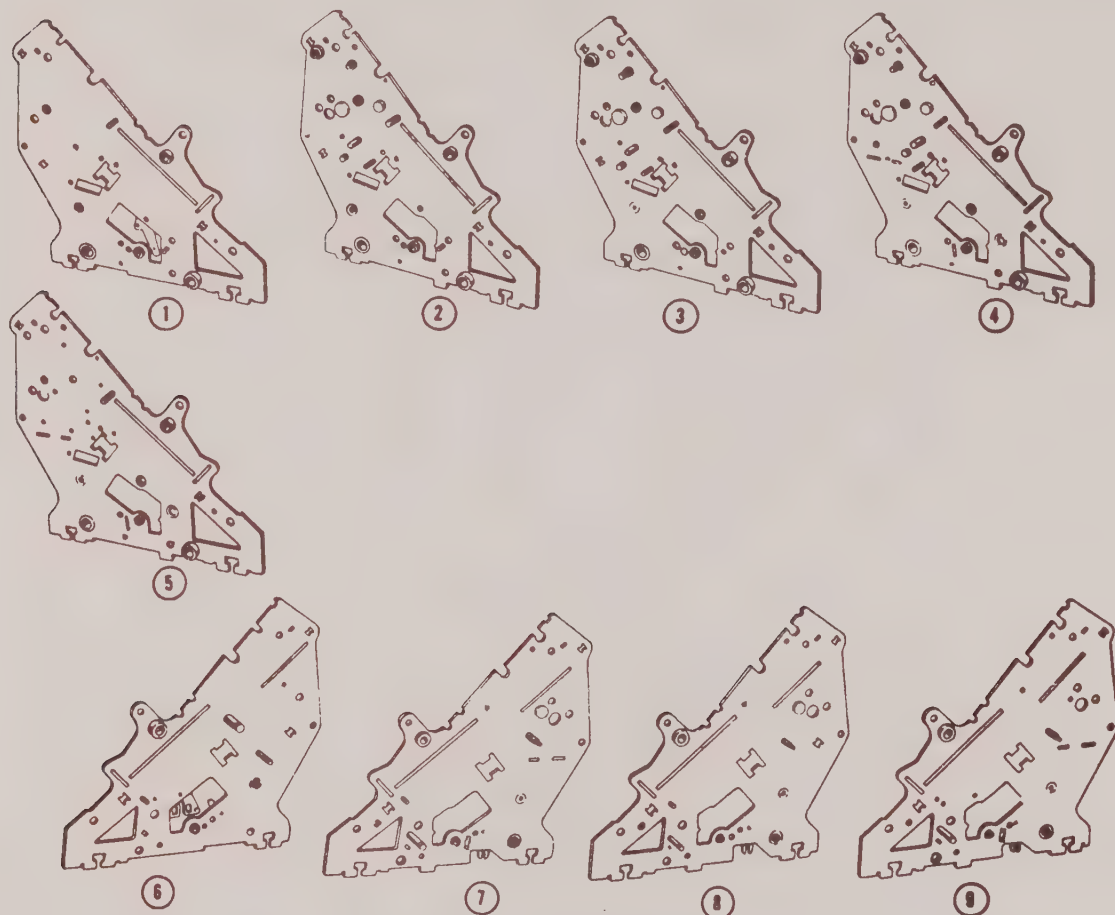


PART NUMBERS (Plate 15)

REF.	DESCRIPTION	PART NUMBER
1	Left side frame for machines before J56297D	1JB110-1
2	Left side frame, shown, used on machs. after J178631D Parts used on machs. between J56297D and J178632D are as follows: 1JB110-18, 1JD43-4, JX253, 45 1/4, X275-4, 1JD3-43, JD3-42, X10-359, JX244, X10-358, JX224, 1JD130-1, 2JD85-8, 2JC117-13 & JB21-17	1JB110-18
3	Left side frame for Series J 289 & J 290's (shown) used on machs. after J178631D Parts used on machs. before J178632D are as follows: 1JB110-19, 1JD43-4, JB21-18, 1JD85-7, 2JC117-12, JX253, 45 1/4, X275-4, 1JD3-43, JD3-42, X10-359, JX244, X10-358 & JX224	1JB110-19
4	Right side frame for machines before J56297D	1JB110
5	Right side frame for machines between J99430D and J210923D Parts used on machs. between J56296D and J99431D are as follows: 1029 0765, JK15-2, JX194, JX82, JB38, 1JD16-0 1JD17-3, 3688, 84813, 1026 4414	1029 0765
6	Right side frame for machines after J212386D (part not illustrated) Parts used on machs. between J210922D and J212387D are as follows: 1029 0781, X57-7, 20 No. 102, 3486 1/2, 3688, 1029 0773, 1029 0799	1029 0781
7	Left side frame for Series J 400 machines (part not illustrated)	1JB110-17

Side Frames

ADDING SECTION SIDE FRAMES, RIGHT AND LEFT (Plate 16)



PART NUMBERS (Plate 16)

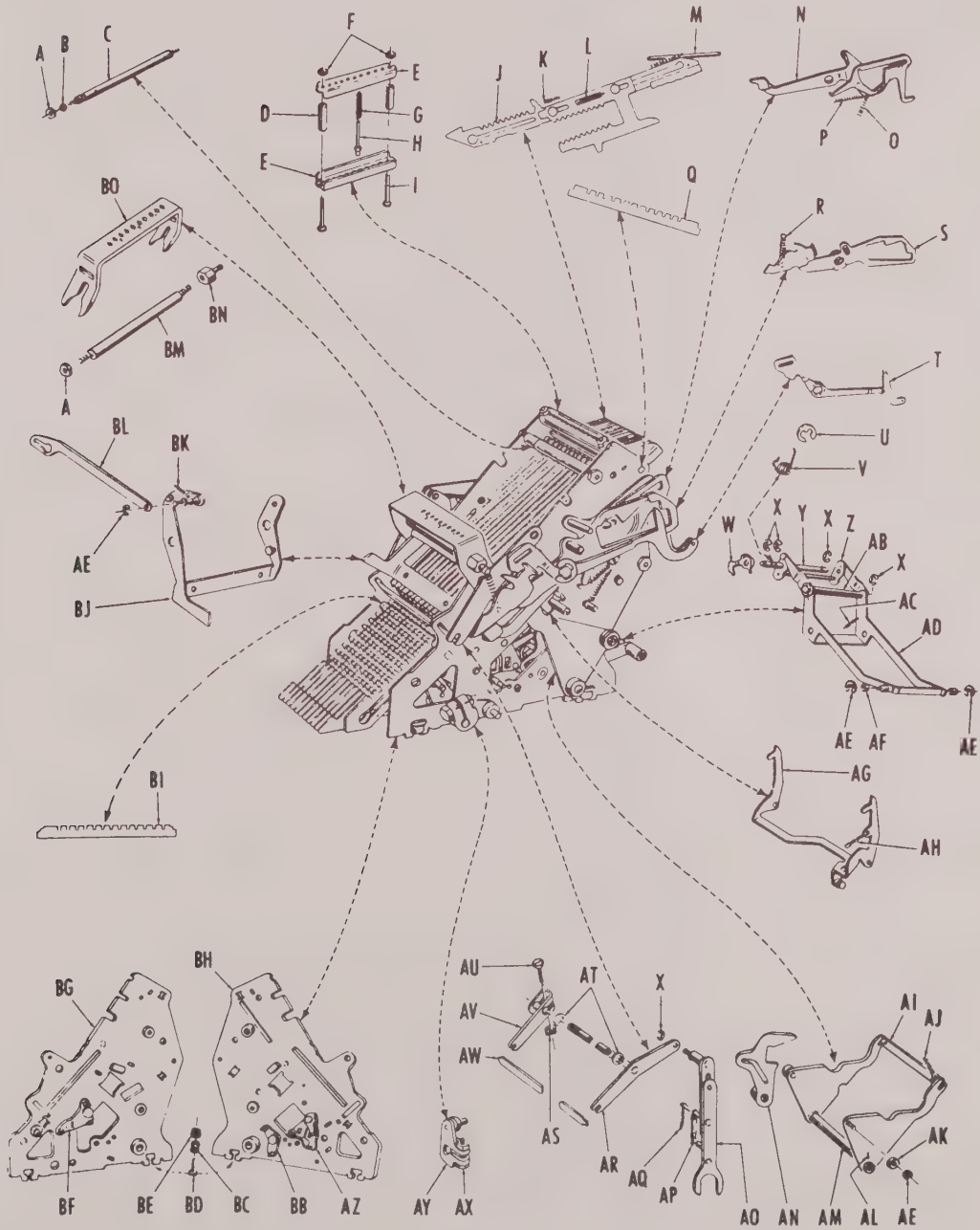
NOTE: When replacing the right side frame on machines after J56297D with 1JT110-11 (shown as Ref. 8), it will be necessary to install 2JT26-3 detent, JX71 eccentric, X80-161 screw.

REF.	DESCRIPTION	PART NUMBER
1	Left frame used on machines before J56297D	1JT110-1
2	Left frame used on machines between J56296D and J66359D	1JT110-5
3	Left frame used on machines between J66358D and J93465D	1JT110-6
4	Left frame, shown, used on machines after J161477D. Parts used on machines between J93464D and J161478D are as follows: 1JT110-28 left frame, JT15-2 guide comb, JT129 lock plate, JX228 limit screw, 84631 3/4 screw, X275-23 lockwasher (2 req.), 46 nut (2 req.) & JT16-1 type bar guide.	1JT110-28
5	Left frame for J 289 only, shown, used on machines after J178677D. Parts used on J 289 machines before J178678D are as follows: 1JT110-31 left frame, JT15-2 guide comb, JT129 lock plate, JX228 limit screw, 84631 3/4 screw, X275-23 lockwasher (2 req.), 46 nut (2 req.), & JT16-1 type bar guide.	1JT110-31
6	Right frame used on machines before J56297D	1JT110-3
7	Right frame, shown used on machines after J114076D Parts used on machines between J93464D and J114077D are as follows: 1JT110-32 and JT16-1	1JT110-32
8	Right frame used on machines after J56296D thru J93465D	1JT110-11
9	Right frame for Series J 289 only, shown, used on machines after J114949D Parts used on machines before J114950D are as follows: 1JT110-33 and JT16-1	1JT110-33

BURROUGHS—SERIES J PARTS CATALOG

Side Frames

ADDING SECTION—BEFORE J56297D (Plate 17)



PART NUMBERS ON NEXT PAGE

PUPPOUGHS—SERIES J PARTS CATALOG

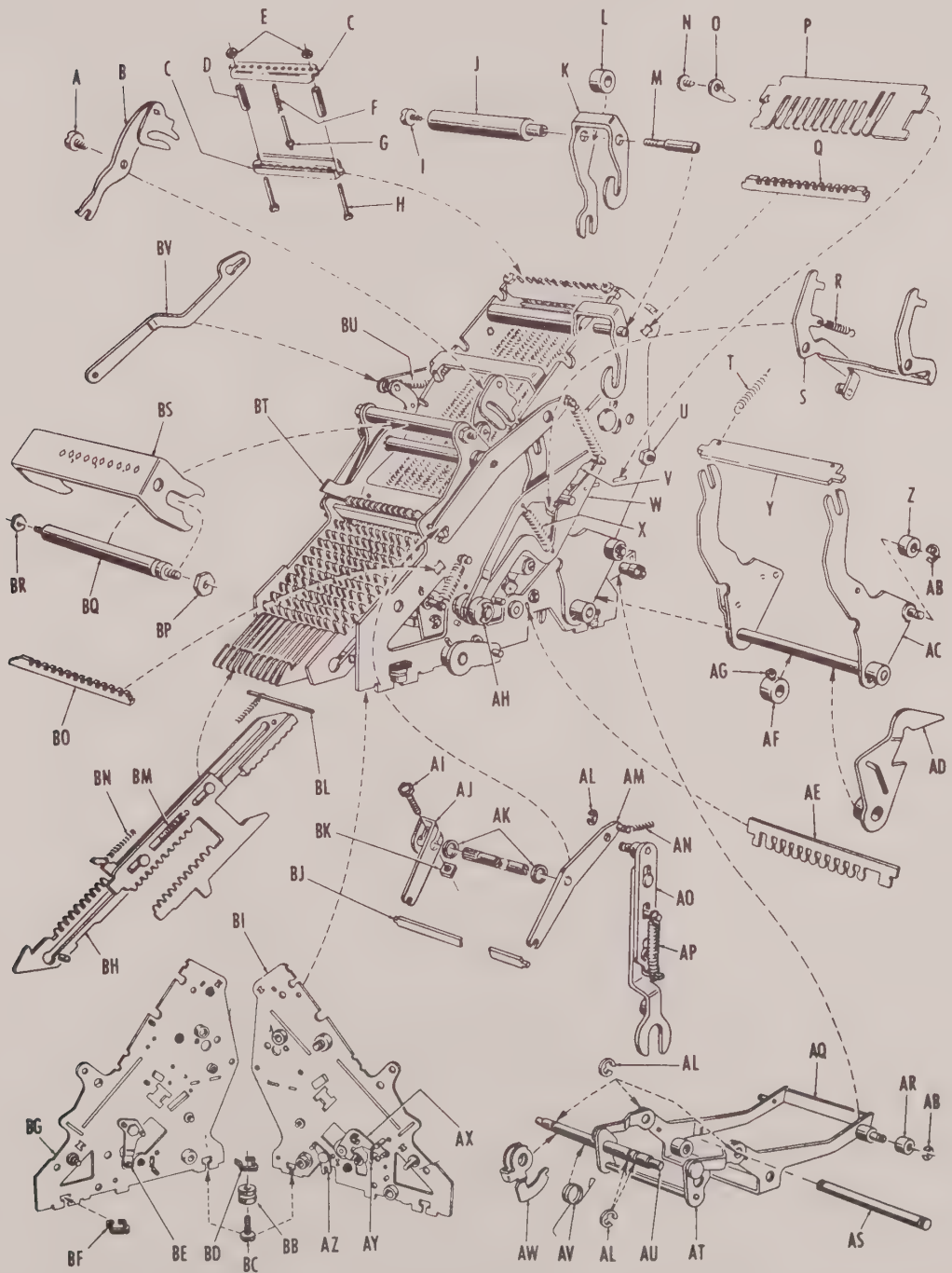
Side Frames

PART NUMBERS (Plate 17)

A	46 $\frac{3}{4}$ nut	
B	X275-23 lockwasher	
C	JT5-1 shown, after J24684D	} tie shaft
	JT5 before J24685D	
D	X10-44 spacing collar (2 req.)	
E	JT17 cushion plate (2 req.)	
F	46 $\frac{1}{2}$ nut	
G	X80-14 compression spring	
H	X36-3 cadmium plate (standard)	} cushion pin
	X36-22 copper plate (short)	
	X36-23 black nickel (long)	
I	X60-37 screw (2 req.)	
J	1JT118-38 plain type bar, see Plate 19, for other styles	
K	1026 4414 for listing type bars	} spring
	81814 for symbol type bars	
L	X80-77 col. 1 only	} adding rack spring
	X80-26 last col., minus bal. mach.	
	76808 all other cols.	
M	JT4 spring anchor shaft	
N	2JT32-1 symbol indexing segment	
O	15805 spring	
P	10686 $\frac{1}{2}$ spring	
Q	JT16-1 type bar guide	
R	X80-96 spring	
S	1JT32-6 shown, after J28725D	} symbol indexing segment
	1JT32-3 before J28726D	
T	1JT32-5 shown, auxiliary segment, minus bal. machs.	
	1JT32-7 auxiliary segment, not minus bal. machs.	
U	X5-6 clip	
V	JT48-1 torsion spring	
W	JT43-3 intermediate rack stop	
X	21 No. 26 clip	
Y	JT37-3 shaft, use 76120 washer and 46 3/4 nut on mchs.	
	before J93465D	
Z	1JT40 adding rack stop bail	
AB	JT38-1 shown, after J41532D	} shaft
	JT38 before J41533D	
AC	JX1 spring	
AD	1029 9154 shown after J41532D	} reset ball
	1JT21 before J41533D	
AE	X133-105 clip	
AF	705339 .250 dia. cadmium plate	} roller, use as required
	X10-271 .280 dia. not plated	
	X10-199 .270 dia. copper plate	
	JX86 .280 dia. nickel plate	
AG	1JT22-1 accumulator locking bail	
AH	73820 spring	
AI	JT14-1 shown, after J34734D	} blade
	JT14 before J34735D	
AJ	1026 4414 spring	
AK	X10-273 .375 dia. not plated	} roller (2 req.) use as required
	X10-42 .387 dia. copper plate	
	X10-113 .399 dia. cadmium plate	
AL	8050 $\frac{3}{4}$ pin	
AM	1JT2-1 type bar restoring frame	
AN	1JT12 total stop cam	
AO	2JT34 aligner arm	
AP	81 fts. 124 No. 2 spring	
AQ	X80-17 spring	
AR	1JT18-1 aligner arm and shaft assembly	
AS	X30-23 nut	
AT	1417 washer	
AU	X233-298 screw, use X275-135 washer	
AV	JT18 left arm	
AW	JT10 aligning blade	
AX	X60-123 hex. head screw, use X30-5 nut	
AY	1JH5 cipher block actuating arm	
AZ	1JT26 detent, use X50-125 rivet after J56206D use X133-107 clip	
BB	1JT19-1 lever, use X50-377 rivet	
BC	X30-32 slotted nut	
BD	X60-157 screw for auxiliary base	
BE	82107 $\frac{1}{4}$ clip	
BF	1JT24 carry lever, use X50-124 rivet	
BG	1JT110-1 left side frame, see Plate 16, for other styles	
BH	1JT110-3 right side frame, see Plate 16, for other styles	
BI	JT15 front type bar guide	
BJ	1JT20-1 type bar blocking bail, use 99331 (.34) collar	
BK	84818 spring	
BL	JT33 spacing pawl control link	
BM	JT5 tie shaft	
BN	JT45 spring anchor nut	
BO	JT27-8 monetary punctuation	} column indicator plate
	JT27-9 no punctuation	

Side Frames

ADDING SECTION AFTER J56296D (Plate 18)



PART NUMBERS ON NEXT PAGE

BURROUGHS—SERIES J PARTS CATALOG

Side Frames

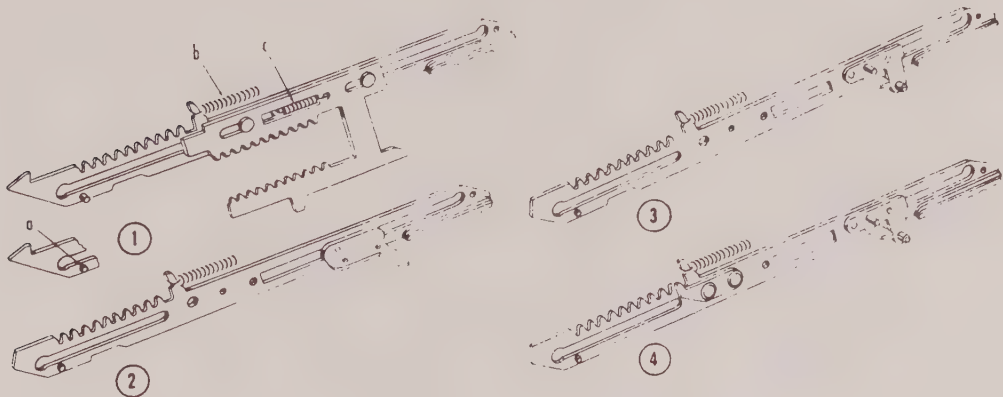
PART NUMBERS (Plate 18)

A	JX50 screw	
B	1JT68 lever	
C	JT17 cushion plate (2 req.)	
D	X10-44 spacing collar (2 req.)	
E	46 $\frac{1}{8}$ hex. nut	
F	X80-14 compression spring	
G	X36-3 cadmium plate (standard)	} cushion pin
	X36-22 copper plate (short)	
	X36-23 black nickel (long)	
H	X60-37 screw (2 req.)	
I	12051 $\frac{3}{4}$ screw	
J	JT49 shaft	
K	JT50 symbol bail	
L	X10-251 spacer	
M	X45-46 screw post	
N	X60-157 screw	
O	JK28 lock arm	
P	JT71 comb	
Q	JT16-1 type bar guide	
R	73820 spring	
S	1JT22-1 accumulator locking bail	
T	XJ21 spring	
U	JT5-1 tie shaft (shown) use 46 nut & X275-23 lockwasher before J56296D	
	Use JT5-5 shaft, JC4-5 shaft & 12051 $\frac{3}{4}$ screws on machs. between J56295D & J100944D	
	Use JT5-5 shaft on machs. after J100943D	
V	1JT52 upper accumulator centralizer	
W	1JT51 lower accumulator centralizer	
X	702808 spring	
Y	JT14-1 blade	
Z	X10-347 .387 dia. copper plated	} required
	X10-348 .399 dia. cadmium plated	
	X10-349 .375 dia. not plated	
AB	X133-105 clip	
AC	1046 1150 shown	} type bar restoring frame
	1046 1168 for J 289 machs	
AD	1JT12-2 shown, use before machs J100944D	} total stop cam
	1JT12-4 use after machs J100943D	
AE	JT72 comb	
AF	1-74308 set collar, includes AG	
AG	12055 $\frac{3}{4}$ screw	
AH	X133-107 clip	
AI	X233-299 screw, use X275-135 lockwasher	
AJ	JT18 left arm	
AK	1417 washer	
AL	21 No. 26 clip	
AM	1JT18-2 aligner arm and shaft assembly	
AN	72806 spring	
AO	2JT34-1 aligner arm	
AP	84815A spring	
AQ	1029 9188 after J93464D	} reset bail
	1029 9154 before J93465D	
AR	705339 .250 dia. cadmium plated	} roller, use as required
	X10-271 .260 dia. not plated	
	X10-199 .270 dia. copper plated	
	JX86 .280 dia. nickel plated	
AS	JT38-1 shaft	
AT	1JT40 shown, before J93464D	} adding rack
	1JT40-1 after J93463D	
AU	JT37-2 shaft	
AV	JT48-3 torsion spring	
AW	JT43-1 intermediate rack stop	
AX	2JT26-3 detent, use X133-105 clip	
AY	283A spring	
AZ	1JT19-3 lever, use X50-377 rivet	
BB	X30-32 slotted nut	
BC	JX41 screw	
BD	JT112 retaining clip	
BE	1JT24-1 carry lever, use X60-246 screw	
BF	82107 $\frac{1}{4}$ retaining clip	
BG	1JT110-6 left side frame, see Plate 16, for other styles	
BH	1JT118-38 plain type bar, see Plate 19, for other styles	
BI	1JT110-11 right side frame, see Plate 16, for other styles	
BJ	JT10 aligning blade	
BK	X30-23 nut	
BL	JT4 spring anchor shaft	
BM	X80-77 col. 1 only	} adding rack spring
	X80-26 last col. minus bal. mach.	
	7680B all other cols.	
BN	1026 4414 for listing type bars	} spring
	81814 for symbol type bars	
BO	JT15-2 type bar guide	
BP	45 $\frac{1}{4}$ nut	
BQ	JT5-1 tie shaft	
BR	46 $\frac{1}{4}$ nut	
BS	JT27-8 monetary punctuation	} column indicator plate
	JT27-9 no punctuation	
BT	1JT20-1 type bar blocking bail, use 89331(34) collar	
BU	84818 spring	
BV	JT33-1 spacing pawl control link	

BURROUGHS—SERIES J PARTS CATALOG

Side Frames

TYPE BAR CHART (Plate 19)



PART NUMBERS (Plate 19)

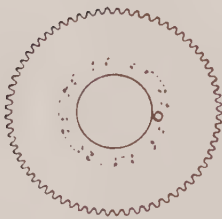
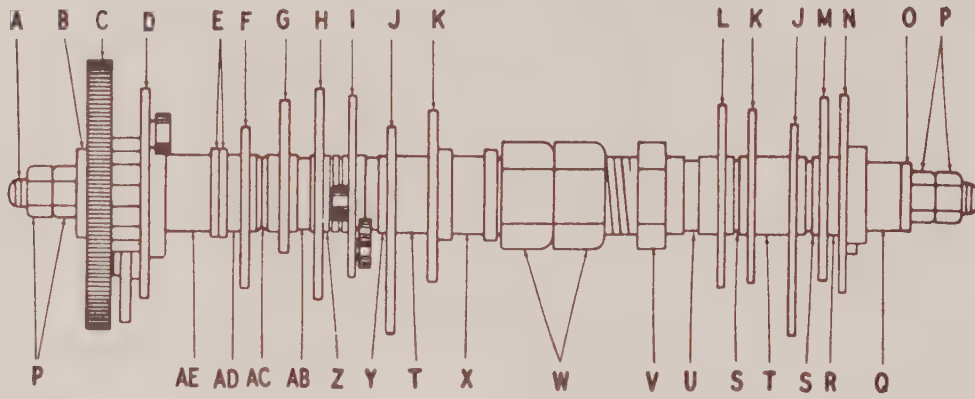
NOTE: Due to a change in the spring anchor of these type bars, a complete set including the symbol bar and restoring blade **JT14-1** must be installed when replacements are needed for machines prior to serial No. J34735D.

REF.	DESCRIPTION	PART NUMBER
1	0 thru 9 plain	1JT118-38
	.0 thru .9 period left	1JT118-39
	0. thru 9. period right	1JT118-41
	0, thru 9, comma right	1JT118-40
	.0 thru .9 comma left	1JT118-42
2	Standard symbol bar used with indexing segments N,S,T, (Plate 17)	1JT118-28
	Option "A" symbol bar used with above segments	1JT118-34
3	Standard symbol bar used between J56296D and J63945D	1JT118-35
	Option "A" symbol bar for above machines	1JT118-37
4	Standard symbol bar used after J63944D; also use JT60-3 selector bail	1JT118-65
	Option "A" symbol bar used after J63944D; also use JT60-3 selector bail	1JT118-66
a	o thru 9 plain, used in Col. 1 only, after J91564D	1JT118-55
b	type bar restoring spring for listing type bars for symbol bars	1026 4414 81814
c	adding rack spring used in Col. 1 only used in last Col., minus bal. machs. used in all other cols.	X80-77 X80-26 7680B

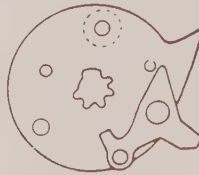
BURROUGHS—SERIES J PARTS CATALOG

Accumulation

CAMSHAFT ASSEMBLY (Plate 25)



C



D



E



F



G



H



I



J



K



L



M



N

PART NUMBERS ON NEXT PAGE

BURROUGHS—SERIES J PARTS CATALOG

Accumulation

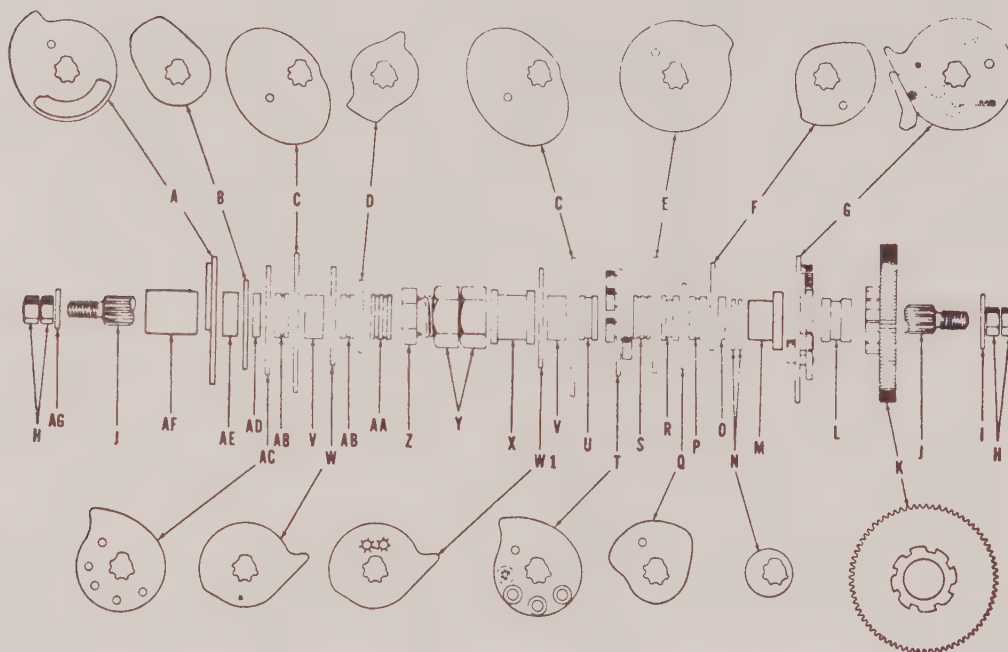
PART NUMBERS (Plate 25)

A	JD1 shaft
B	X1-12 washer
C	1JD4 drive clutch gear
D	2JD3 cam for restoring drive trip
E	JD3-1 cam for ribbon feed (2 req.)
F	JD3-2 cam for listing hooks
G	JD3-3 cam for total hooks
H	JD3-4 cam for type alignment
I	1JD3-41 cam for cipher block and printing
J	1029 0716 cam for type bar restoring bail
K	JD3-7 shown, cam for carry pawl and adding rack reset, before J100944D
	JD3-29 cam for carry pawl and adding rack reset after J100943D
K1	1JD3-28 cam for carry pawl and adding rack reset and for carry bail latch
L	JD3-8 cam for accumulator locking bail
M	JD3-9 cam for printing (shown)
	JD3-10 cam for restoring intermediate keyboard, use before mach. J24676D and not required after mach. J24675D
N	1JD3-18 use after mach. } cam for blocking listing keyboard, J24675D } carriage restoring and platen feed 1JD3-11 use before mach. } pawl disengagement J24676D }
O	X1-11 washer
P	X30-6 hex. nut (4 req.)
Q	X10-207 (shown) use after mach. J24675D } spacing collar X10-127 use before mach. J24676D }
R	Use JX223 spacing collar
S	X10-56 spacing collar (grooved)
T	X10-54 spacing collar (plain)
U	X10-233 spacing collar (grooved)
V	X60-39 variable spacing collar
W	X30-9 hex. nut for variable spacing collar
X	JX87 spacing collar
Y	X10-53 spacing collar (grooved)
Z	X10-48 spacing collar, 2 grooves
AB	X10-48 spacing collar (grooved)
AC	X10-51 spacing collar (grooved)
AD	X10-55 spacing collar (plain)
AE	X10-49 spacing collar (shoulder)

BURROUGHS—SERIES J PARTS CATALOG

Accumulation

CAMSHAFT ASSEMBLY—STYLE 3 (Plate 26)



PART NUMBERS (Plate 26)

- | | | | | |
|---|---|--------------------------------|----|-------------------------------------|
| A | 1JD3-18 before J178632D | } restoring cam | R | X10-48 grooved spacing collar |
| | 1JD3-43 between J178631D & J215110D | | S | X10-48 spacing collar (2 grooves) |
| | 1029 0617 after J215109D | | | |
| B | JD3-17 before J178632D | } red ribbon cam | T | 1JD3-41 before J215110D |
| | JD3-42 between J178631D & J215110D | | | 1029 0708 after J215109D |
| | 1029 0625 after J215109D | | U | X10-53 grooved spacing collar |
| C | 1029 0716 cam for type bar restoring bail | | V | X10-54 plain spacing collar |
| D | JD3-8 before J215110D | } cam for accumulator | W | JD3-7 before J100944D |
| | 1029 0724 after J215109D | | | JD3-2 between J100943D and J215110D |
| | 1029 0633 after J215109D | | | reset cam, for adding rack reset |
| E | JD3-4 before J215110D | } cam for type alignment | W1 | 1JD3-28 before J215110D |
| | 1029 0740 after J215109D | | | 1029 0732 after J215109D |
| F | JD3-13 before J215110D | } list cam | | reset cam, for carry bail latch |
| | 1029 0666 after J215109D | | | |
| G | 2JD3 before J215110D | } cam for restoring drive trip | X | JX87 spacing collar |
| | 1029 0674 after J215109D | | | Y |
| H | X30-6 hex nut | | Z | X60-39 spacing collar |
| I | X1-12 washer | | AA | X10-233 grooved spacing collar |
| J | JD1 shaft | | AB | X10-56 before J178632D |
| K | 1JD4 drive clutch gear | | | X10-358 after J178631D |
| L | X10-50 bushing | | | } grooved spacing collar |
| M | X10-49 shoulder spacing collar | | AC | JD3-9 before J215110D |
| N | JD3-1 before J215110D | } cam for ribbon feed | | 1029 0641 after J215109D |
| | 1029 0690 after J215109D | | | AD |
| | | | | JX244 after J178631D |
| O | X10-55 plain spacing collar | | AE | X10-287 before J178632D |
| P | X10-51 grooved spacing collar | | | X10-359 after J178631D |
| Q | JD3-14 before J215110D | } total cam | AF | JX224 spacer |
| | 1029 0658 after J215109D | | | AG |

APPENDIX 4

Model 1453 Compatibility with Integrated Circuit Voltage Levels

(Used with Beckman Models 6148, 6155, 6401*,
and 6200 and 6300 Series Instruments.)

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APPENDIX 4

MODEL 1453 COMPATIBILITY WITH INTEGRATED CIRCUIT VOLTAGE LEVELS

1. IC INPUT MODULE

The IC Input Module is designed to interface the Model 1453 Printer to instruments having integrated circuit output voltage levels. This module is housed in the same mechanical package as the standard four-line input module, and plugs into the same input sockets without modification to the printer.

The schematic diagram (dwg. no. C525727), associated assembly drawings, and parts list of this module are shown on pages 3 through 6. A comparison of this schematic and the schematic of a standard Model 1453 four-line input module (dwg. no. B404461) shows that the coincidence comparator, two-stage trigger circuit and pawl magnet driver are identical in both units. A DTL (Diode-Transistor Logic) integrated circuit flatpack (Z1) has been added to serve as an input amplifier. The output of the four DTL gates is applied to simple inverting level changers (Q1 through Q4) which change the 0 to +5 volt integrated circuit logic levels to 0 to -14 volt levels for entry into the coincidence comparator circuit. The theory of operation of the remainder of the module is given in paragraph 3.5.2 of the Model 1453 Printer manual.

A physical layout of the IC Input Module (dwg. no. D525701) is shown on page 6.

The DTL flatpack (Z1) consists of four inverting NAND gates which serve to buffer the input lines and to provide some noise rejection. An input logic level of from 0 to +0.45 volt holds the NAND gate outputs at +5 volts. This keeps the level changer transistors (Q1 through Q4) turned off and thus presents -14 volt inputs to the coincidence comparator. This is equivalent to a logic zero in the case of the standard module.

A +2.5 volt to +5.5 volt input to the NAND gates holds their outputs to ground and permits the level changer transistors to turn on. This presents a 0 volt input (logic one in the standard module) to the coincidence comparator.

Therefore, the logical inputs to the IC Input Module are: a logic zero = 0 to +0.45 volt (the signal source must be capable of sinking 1.6 milliamps of current at these voltage levels); a logic one = +2.5 to +5.5 volts (the leakage current into the input terminal is a maximum of 5 microamps at these voltage levels).

Power for the DTL flatpack is derived from the +8 volts available on the module input connector. The +8 volts is applied to an emitter follower which has a resistor divider between collector and base. The ratio of R66 and R27 is set to provide a +5 volt output at the emitter of Q8.

To operate this module with inverted logic, i.e., a logic one = 0 to +0.45 volt and a logic zero = +2.5 to +5.5 volts, the DTL flatpack (Z1) can be removed and jumper wires inserted between pins 1 and 3, 4 and 6, 9 and 8, and 12 and 11 of the flatpack.

2. IC INPUT MODULE TEST PROCEDURE

The most straightforward method of testing the IC Input Module is shown in Figure 1. Inputs to the module are obtained from an RTL flatpack. To closely simulate the output of a Model 6148, 6200 Series or 6300 Series Counter, a Motorola CM 724P should be used. The inputs to this gate are controlled by four toggle switches. Connect the IC Input Module to the Model 1453 Printer and apply a print command pulse to the printer from a pulse generator. Test all digits from 0 through 9 by manipulating the four toggle switches.

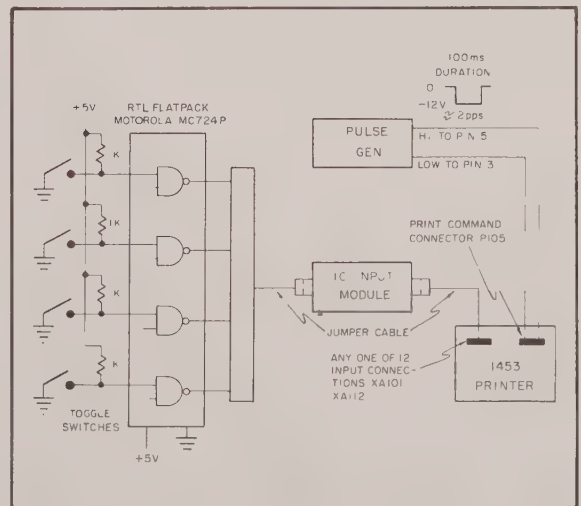


Figure 1. Testing IC Input Modules

3. PRINTER CONTROL MODULE

The Printer Control Module provides the proper interface between Beckman Models 6148, 6200 Series or 6300 Series Counters and Model 1453 Printer. This module is encapsulated in plastic and inserted between the normal printer control input plug (J409) and the control input receptacle (P105). A physical layout of the control module is shown on page 10 (dwg. no. C525702).

The standard Model 1453 Print Command input is a 0 to -12 volt pulse of 100 milliseconds duration. The data source counting units emit a print command of 0 to +5 volts of 25 microseconds duration. The Printer Control Module accepts this short duration IC logic level pulse and converts it to a pulse of standard level and duration (0 to -12 volt pulse of 100 milliseconds duration). In addition, it furnishes an inhibit (0 volt) level to the counters immediately upon receipt of the print command pulse. This inhibit pulse remains at ground level until the Model 1453 Printer is ready to accept another print command.

A schematic diagram of the Printer Control Module is shown on page 9 (dwg. no. D525731). This module consists primarily of two one-shots and a level changer. A 0 to +5 volt print command pulse is received from a counter (or other device) and applied to a filter for purposes of noise rejection. The 47Ω resistor (R1) and $0.01\mu\text{f}$ capacitor (C1) are selected for the 25 microsecond print command pulses emitted by the data source counting units. The capacitor value has to be lowered if shorter input pulses are encountered from other devices. The input pulse is inverted by one DTL NAND gate and used to set two dc flip-flops, made by connecting NAND gates back-to-back. When set, each flip-flop causes clamp transistors Q1 and Q2 to turn off. These clamp transistors are connected across the 2.5 microfarad capacitors in the two delay circuits. Capacitors C2 and C3 commence charging toward +8 volts. When the firing point of the unijunction transistors, Q4 and Q5, is reached, the capacitors quickly discharge. The discharge pulse is coupled through transistors Q7 and Q8 to the reset side of the flip-flops.

The upper delay circuit (Q1, Q4, Q7) is set for a nominal delay of 100 milliseconds. This causes the level changer Q3, which is connected to the set side (pin 11 of Z1) of the upper flip-flop, to produce a 100 millisecond -14 volt pulse which is used as a Model 1453 Print Command input (pin 5 of J1).

The second delay circuit (Q2, Q5, Q8) is set to a nominal value of 400 milliseconds. The purpose of this delay and its associated flip-flop is to provide an inhibit signal to the input counter which is turned on simultaneously with the print command and remains on until the printer is ready to accept another print command.

The duration of the delay in the two delay circuits is adjusted by selecting the value of R6 and R7. These resistors are selected when the module is tested. Resistor R6 is chosen to provide a 100 millisecond print command at pin 5 of J1; R7 to provide a 400 millisecond inhibit pulse at pin 1 of P1. To test the module, apply +8 volts to pin 4 of J1 and -14 volts to pin 8 of J1. If pin 5 of P1 is left open, simulating a constant true input signal, both one-shots will free run. Place a scope across C2 and C3 to measure the delay runup time. Select R6 and R7 to provide the correct ramp lengths of 100 and 400 milliseconds, respectively.

4. FOUR-LINE INPUT CABLE

Wiring for the input cable is shown on pages 11 and 12. This cable is used to connect Model 6148, 6200 and 6300 Series counters to a Model 1453 Printer equipped with IC Input Modules and the IC-compatible control module.

5. MODEL 1453 PRINTER MODIFICATION

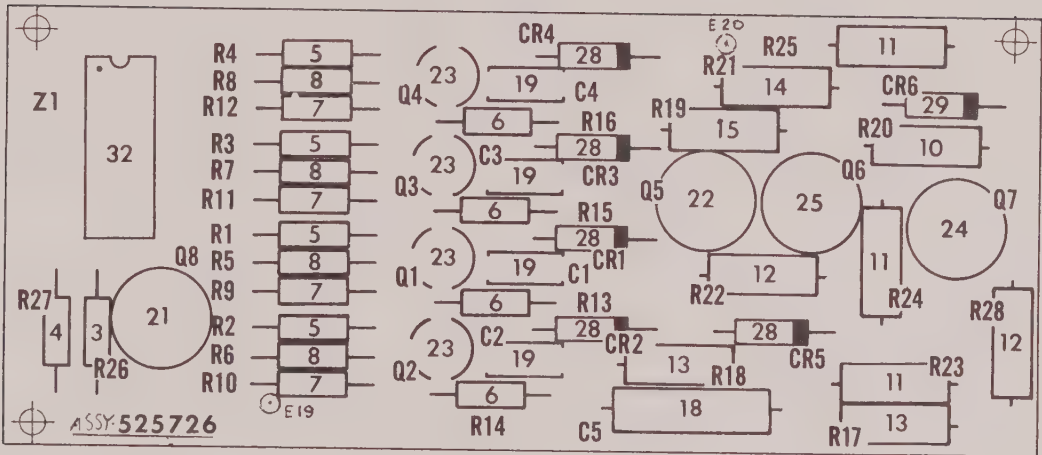
If a printer has not been designed for use with the IC Control Module, a two-wire modification to the printer is necessary. To route power to the Control Module, tie +8 volts and -14 volts to pins 4 and 8, respectively, of P105 as follows:

- 1) Solder two wires to tabs on the power supply filter capacitors which have the two required voltages.
- 2) Pass the wires up through the printer chassis and over to the top of P105.
- 3) Strip the wires and wrap them around pins 4 and 8.
- 4) Solder the wires to the bottom of the pins.
- 5) Push J1 of the IC Control Module into place over the newly soldered wires.

NOTE

Pins 3 and 7 of P1 are connected together inside the cover of P1.

The code control is now 1-2-4-8, which is compatible with Beckman Models 6148, 6200 Series and 6300 Series instruments.

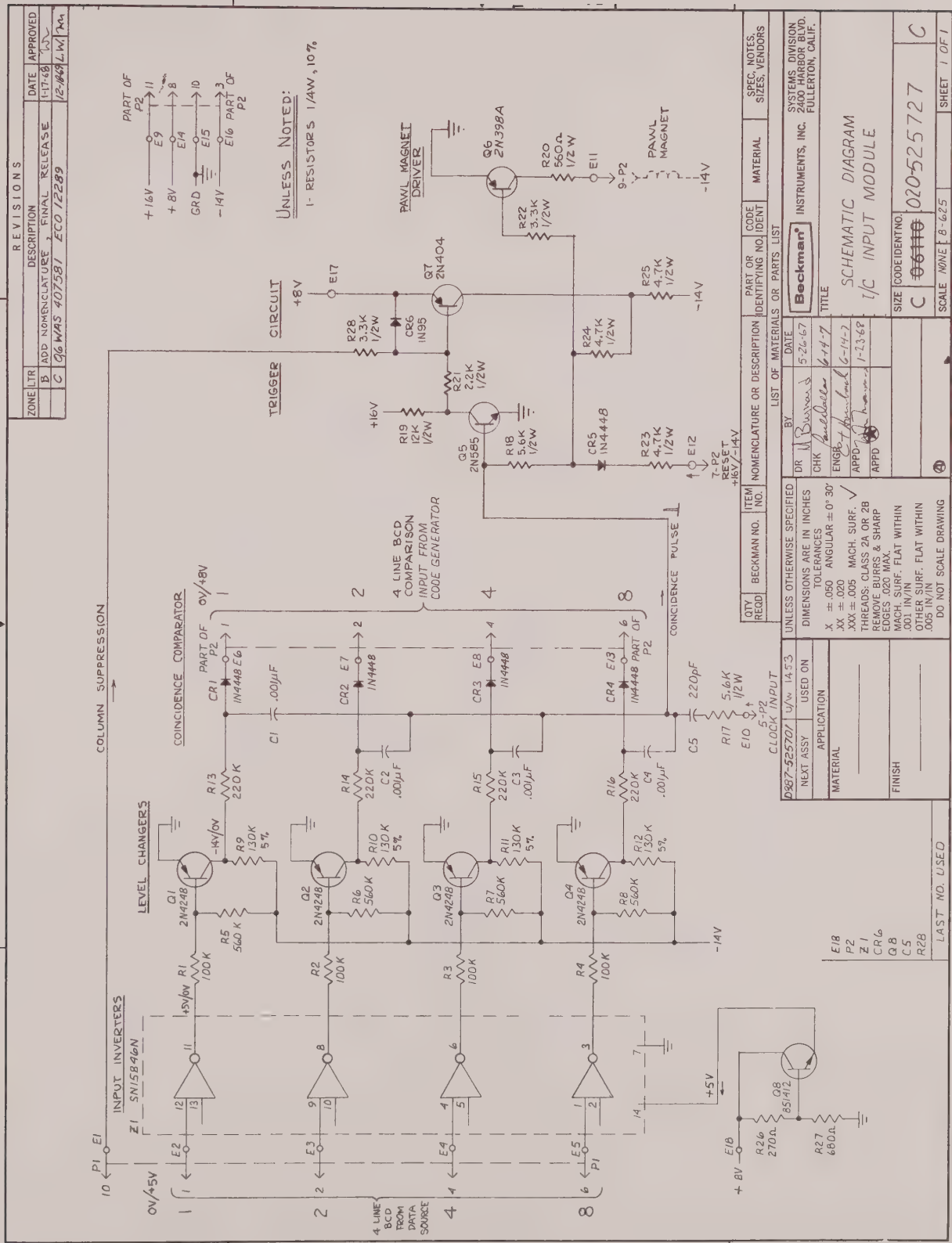


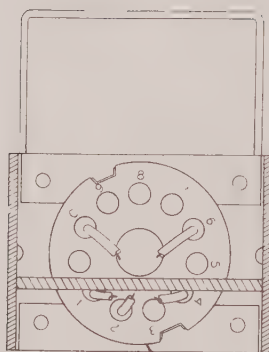
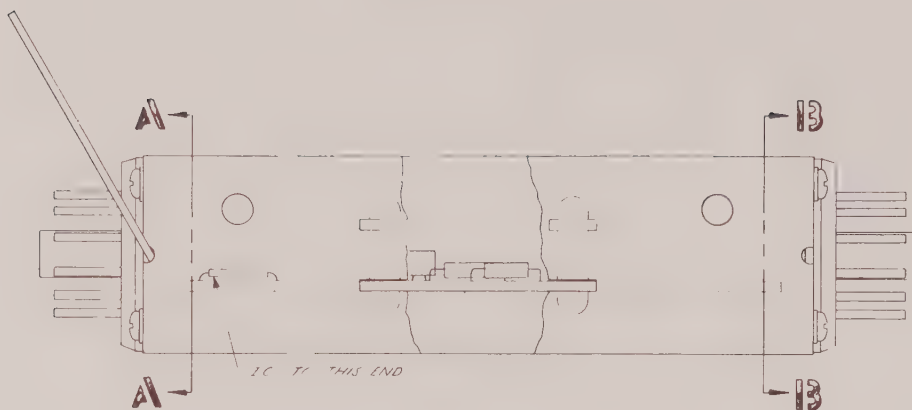
IC INPUT MODULE PRINTED WIRING ASSEMBLY

IC INPUT MODULE
PARTS LIST

<u>Item No.</u>	<u>Detail No.</u>	<u>Beckman Part No.</u>	<u>Description</u>	<u>Typical Manufacturer & No.</u>	<u>Qty./ Assy.</u>
		C-525726-C	IC Input Module P. C. Board Assy.	Beckman	
19	C1 thru 4	637-822757	Capacitor, 0.001 μ f, 100V, 5%	Electromotive DM15-F102J0-100WV4CR	4
18	C5	637-804765	Capacitor, 220pf, 500V, 5%	Sangamo CM15-E221J03	1
28	CR1 thru 5	755-838731	Diode, 1N4448	Continental Devices	5
29	CR6	755-402107	Diode, Special	Beckman	1
23	Q1 thru 4	755-846416	Transistor, 2N4248	Fairchild	4
22	Q5	755-800415	Transistor, 2N585	G. E.	1
25	Q6	755-817800	Transistor, 2N398A	RCA	1
24	Q7	755-800398	Transistor, 2N404	Texas Insts.	1
21	Q8	755-851412	Transistor, Special	Beckman	1
5	R1 thru 4	601-812741	Resistor, 100K, 1/4W, 10%	*A. B. CB1041	4
8	R5 thru 8	601-823962	Resistor, 560K, 1/4W, 10%	A. B. CB5641	4
7	R9 thru 12	601-819675	Resistor, 130K, 1/4W, 5%	A. B. CB1345	4
6	R13 thru 16	601-812742	Resistor, 220K, 1/4W, 10%	A. B. CB2241	4
13	R17, 18	601-008085	Resistor, 5.6K, 1/2W, 10%	A. B. EB5621	2
15	R19	601-008089	Resistor, 12K, 1/2W, 10%	A. B. EB1231	1
10	R20	601-008073	Resistor, 560 Ω , 1/2W, 10%	A. B. EB5611	1
14	R21	601-008080	Resistor, 2.2K, 1/2W, 10%	A. B. EB2221	1
12	R22, 28	601-010684	Resistor, 3.3K, 1/2W, 10%	A. B. EB3321	2
11	R23, 24, 25	601-008084	Resistor, 4.7K, 1/2W, 10%	A. B. EB4721	3
3	R26	601-823934	Resistor, 270 Ω , 1/4W, 10%	A. B. CB2711	1
4	R27	601-823937	Resistor, 680 Ω , 1/4W, 10%	A. B. CB6811	1
32	Z1	885-846627	Integrated Circuit, SN15846N	Texas Insts.	1
26		864-811098	Transistor Pad	F. P. Adams 603090	4

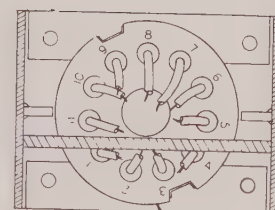
*"A. B." are Allen Bradley, fixed composition resistors.





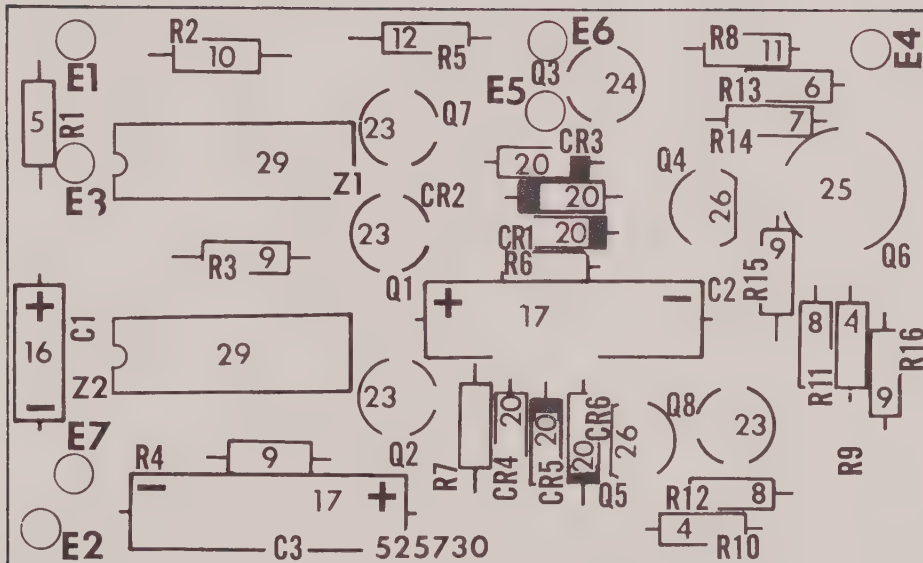
SECTION A-A
P1

WIRE LIST					
#26 AWG	COLOR	DESTINATION	LENGTH	PROCESSING	
WIRE # 1	BN	FROM PIN # 1 OF P1 TO E2	1"	1/8"	3/4"
WIRE # 2	RD	FROM PIN # 2 OF P1 TO E3	4"		
WIRE # 3	DR-WH	FROM PIN # 4 OF P1 TO F4	2 3/4"		
WIRE # 4	BL	FROM PIN # 6 OF P1 TO E5	2"		
WIRE # 5	BK	FROM PIN # 10 OF P1 TO E1	5"		
WIRE # 6	BN	FROM PIN # 1 OF P2 TO E6	4 1/2"		
WIRE # 7	RD	FROM PIN # 2 OF P2 TO E7	4 1/2"		
WIRE # 8	OR	FROM PIN # 3 OF P2 TO E16	4 1/2"		
WIRE # 9	YL	FROM PIN # 4 OF P2 TO E8	4"		
WIRE # 10	GN	FROM PIN # 5 OF P2 TO E10	2"		
WIRE # 11	BL	FROM PIN # 6 OF P2 TO E13	3"		
WIRE # 12	VD	FROM PIN # 7 OF P2 TO E12	2"		
WIRE # 13	GY	FROM PIN # 8 OF P2 TO E14	2"		
WIRE # 14	WH	FROM PIN # 9 OF P2 TO E11	2"		
WIRE # 15	BK	FROM PIN # 10 OF P2 TO E15	2 1/2"		
WIRE # 16	BK-GN	FROM PIN # 11 OF P2 TO E9	3 1/2"		
WIRE # 17	BK	FROM E17 TO E18	3 1/2"	1/8"	
WIRE # 18	BK	FROM E19 TO E20	2 1/2"	1/8"	



SECTION B-B
P2

IC INPUT MODULE TOP ASSEMBLY



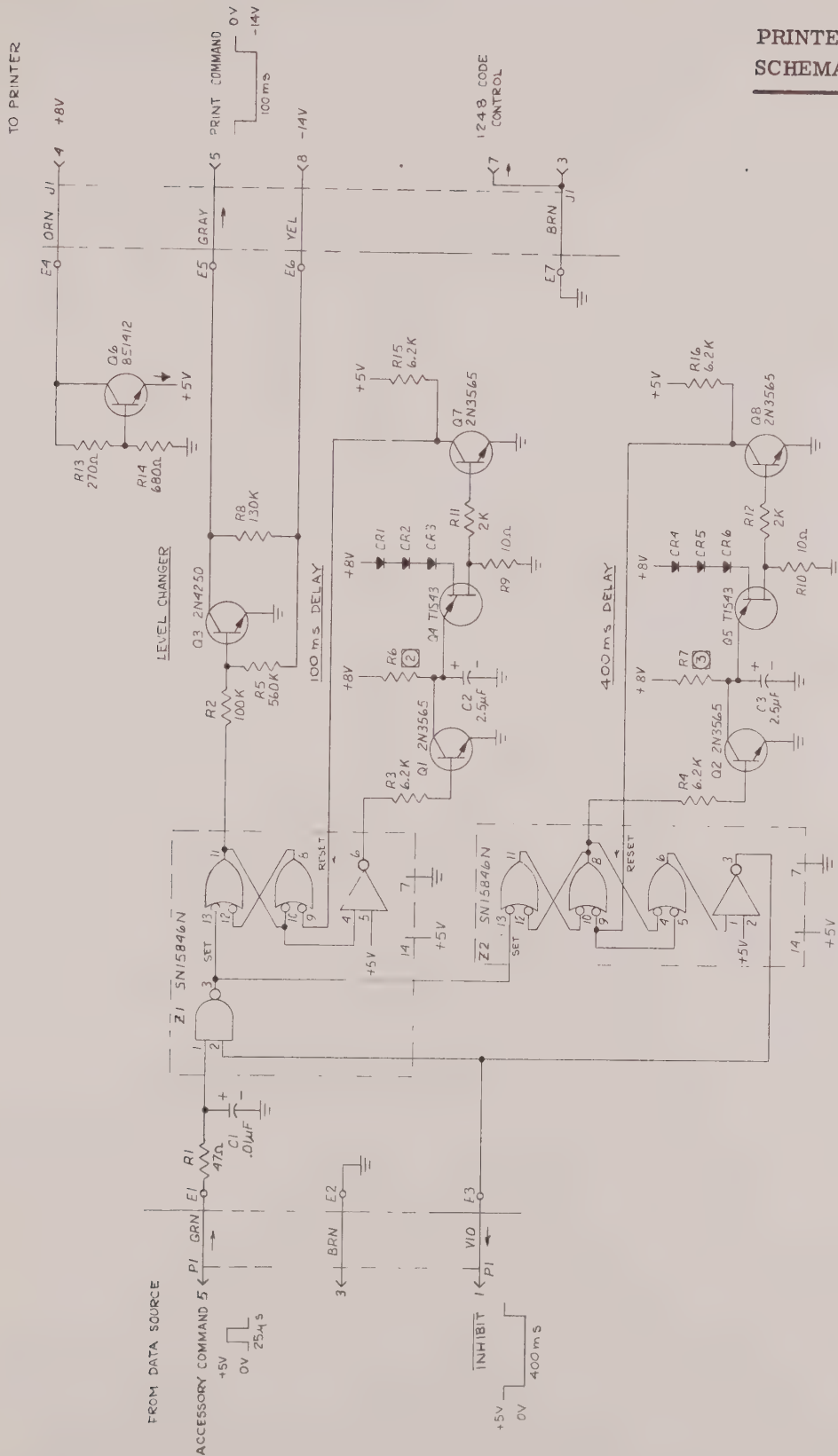
PRINTER CONTROL MODULE PRINTED WIRING ASSEMBLY

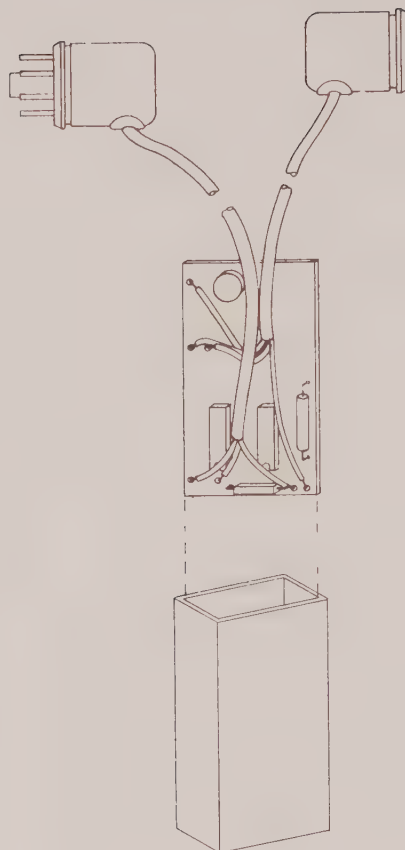
PRINTER CONTROL MODULE PRINTED WIRING ASSEMBLY
PARTS LIST

<u>Item No.</u>	<u>Detail No.</u>	<u>Beckman Part No.</u>	<u>Description</u>	<u>Typical Manufacturer & No.</u>	<u>Qty./ Assy.</u>
		B-522730-B	Printer Control Module Printed Wiring Assembly	Beckman	
16	C1	639-822914	Capacitor, 0.01 μ f, 100V, 20%	Electron M1-103/ ELP. VXIE-103	1
17	C2, 3	631-813699	Capacitor, 2.5 μ f, 30V, 20%	Mil. Type No. CL- 35BH2R5MP3	2
20	CR1 thru 6	755-845049	Diode, FDH627	Fairchild	6
23	Q1, 2, 7, 8	755-838784	Transistor, 2N3565	Fairchild	4
24	Q3	755-846164	Transistor, PNP, 2N4250	Fairchild	1
25	Q6	755-851412	Transistor, Special	Beckman	1
26	Q4, 5	755-846459	Transistor, TIS43	Texas Instruments	2
5	R1	601-823387	Resistor, 47 Ω , 1/4W, 5%	*A.B. CB4705	1
10	R2	601-823904	Resistor, 100K, 1/4W, 5%	A.B. CB1045	1
9	R3, 4, 15, 16	601-822330	Resistor, 6.2K, 1/4W, 5%	A.B. CB6225	4
12	R5	601-823913	Resistor, 560K, 1/4W, 5%	A.B. CB5645	1
13	R6, 7	xxx-xxxxxx	Resistor, Selected	Beckman	2
11	R8	601-819675	Resistor, 130K, 1/4W, 5%	A.B. CB1345	1
4	R9, 10	601-823379	Resistor, 10 Ω , 1/4W, 5%	A.B. CB1005	2
8	R11, 12	601-822293	Resistor, 2K, 1/4W, 5%	A.B. CB2025	2
6	R13	601-823393	Resistor, 270 Ω , 1/4W, 5%	A.B. CB2715	1
7	R14	601-822369	Resistor, 680 Ω , 1/4W, 5%	A.B. CB6815	1
29	Z1, 2	885-846401	Integrated Circuit, SN15846N	Texas Instruments	2
27		864-811098	Transistor Pad	F. P. Adams 603090	1

*"A. B. " are Allen Bradley, fixed composition resistors.

PRINTER CONTROL MODULE SCHEMATIC DIAGRAM

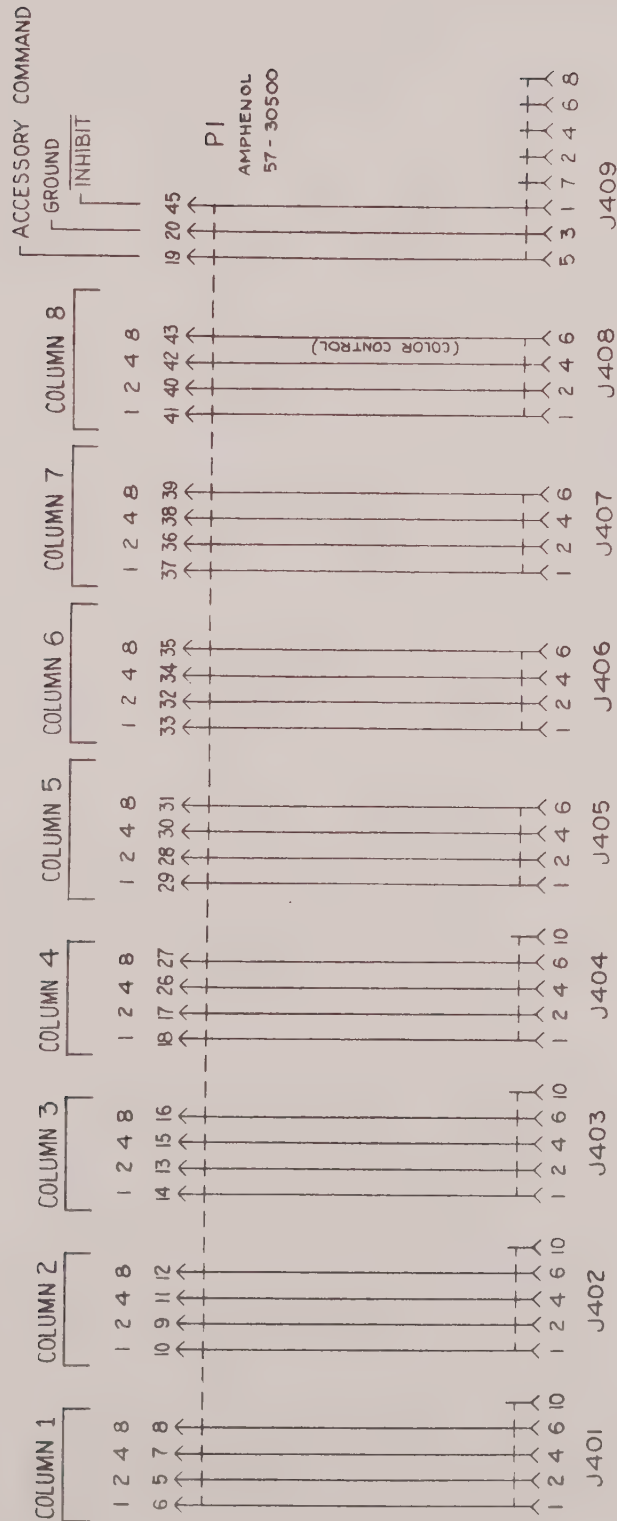


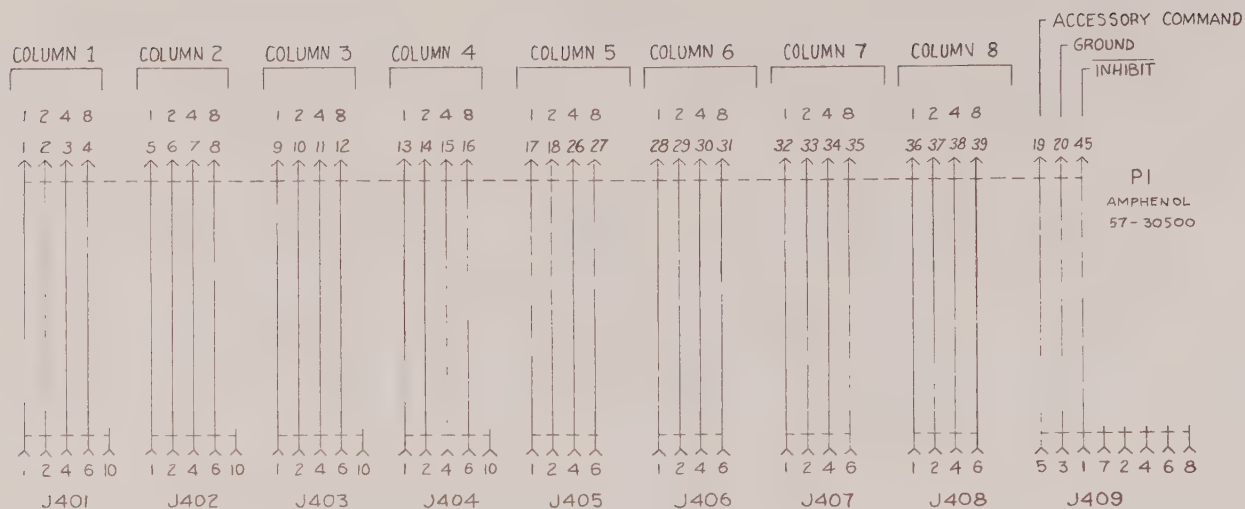


WIRING LIST	
WIRE # 1	FROM PIN # 1 OF PI TO E3
WIRE # 2	FROM PIN # 3 OF PI TO E2
WIRE # 3	FROM PIN # 5 OF PI TO E1
WIRE # 4	FROM PIN # 3 OF J1 TO E7
WIRE # 5	FROM PIN # 4 OF J1 TO E4
WIRE # 6	FROM PIN # 5 OF J1 TO E5
WIRE # 7	FROM PIN # 8 OF J1 TO E6
WIRE # 8	FROM PIN # 3 OF J1 TO PIN # 7 OF J1

PRINTER CONTROL MODULE TOP ASSEMBLY

FOUR-LINE INPUT CABLE
8 COLUMN
SCHEMATIC DIAGRAM





FOUR-LINE INPUT CABLE SCHEMATIC DIAGRAM for MODEL 6401

Model 1453 Appendix
(u/w Model 6401)
C437168-Rev. A
December 1969

Beckman*

FOUR-LINE INPUT CABLE PARTS LIST for MODEL 6401

Beckman Part No.	Description	Typical Manufacturer & No.	Qty./ Assy.
664-437166 (A)	Four-Line Input Cable	Beckman	
860-011948	Socket, 11-Pin	Amphenol 78-S11T	8
860-029566	Socket, 8-Pin	Amphenol 78-S8	1
672-814648	Connector & Hood Assembly	Amphenol 57-30500	1

6. IC CONTROL MODULE (Revised)

(Assembly No. A855-436957)

This module is intended to interface control signals from IC level data sources to the Model 1453 control electronics.

The IC Control Module Board Assembly drawing (A436957) and its associated parts list is shown on page 13; the schematic diagram (B436956) on page 14.

A. PRINT COMMAND (pin 5 of P1)

$Z = 1 \text{ TTL Load} \approx 3K$

- 1) Accepts positive-going IC level pulse from data source, 30 μs nominal. IC levels defined as:
 $0 = +0.45V$
 $1 = +2.5 \text{ to } +5.5V$
- 2) Pulse can be as narrow as 50 ns or as long as desired with the following understanding:
 - (a) A single-shot will extend all pulses of < 100 ms to approximately 100 ms and present this extended pulse to the printer on pin 5 of J1.
 - (b) Input pulses > 100 ms in duration will override the single-shot and the longer pulse will be applied to the printer. If this is the case, the minimum time between print command pulses is 15 ms.

B. INHIBIT

This signal is a contact closure through 220 Ω to ground. It is furnished by the printer to keep the data source constant during the time the data is being processed. No new print command signals should be issued by the data source during this time.

The inhibit return is dependent upon the mechanical action of the printer and because of this it may be too slow in being applied to the data

source to prevent updating. To combat this possible problem, the actual inhibit signal returned to the data source is an OR function of the print command single-shot output and the printer inhibit signal. In this way the data source is inhibited immediately by the print command signal and remains inhibited for the duration of the printer inhibit signal.

Upon termination of the inhibit signal at pin 1 of P1, the data source is free to update and the printer ready to receive a new print command.

C. COLOR CONTROL (Pin 6 of P1)

Input $Z = 6.8K$

The printer is capable of red or black printout. Black printout is automatic and no external control is required, although an IC high level (logic 1) can be on the color control line (pin 6 of P1).

For red printout, pin 6 of P1 must be at ground or IC logic 0.

The color control signal can be continuously applied or applied only when a print command is issued. It should remain constant during the actual printing sequence. The signal to the printer (pin 6, J1) is Black, -14 volts through 120K and Red, ground through saturated Q3.

D. PRINTING RATE

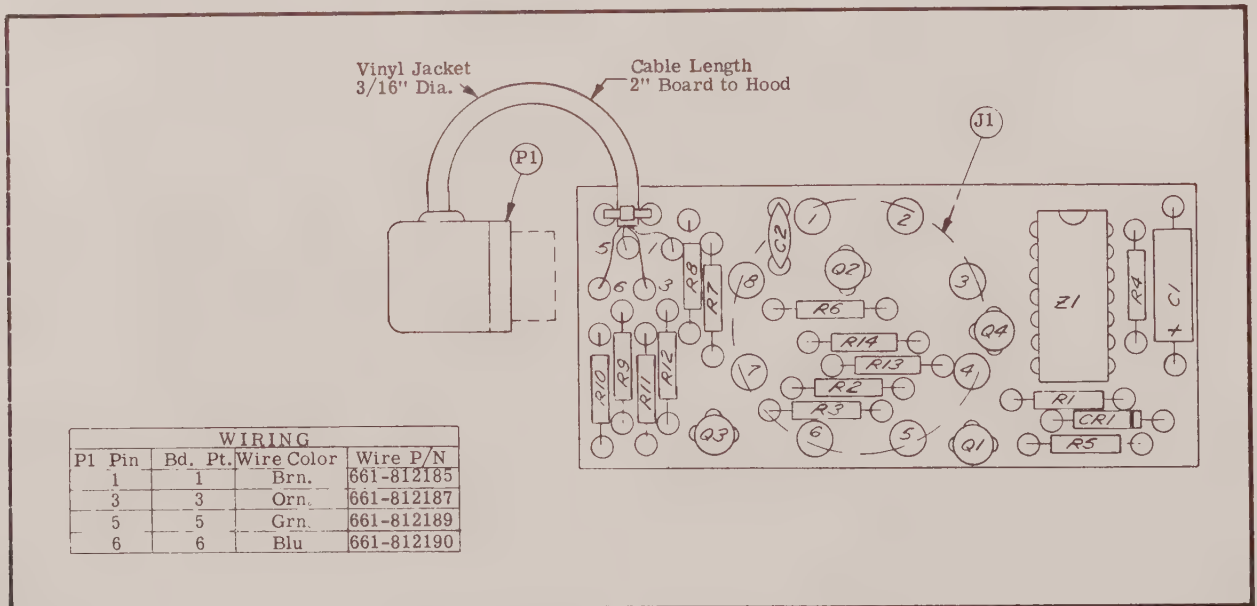
The IC control module allows the printer to operate up to its maximum rate (i.e., three lines per second). The conditions for maximum operation are that the data source must be able to recycle, update its data, and provide a new print command during the interval from end-of-inhibit to end-of-print cycle. This time is approximately 100 ms or less.

This assembly mounts in the Model 1453 printer mechanism by plugging directly onto connector P105. The cable end connects to J409 of the printer cable.

PARTS LIST IC CONTROL MODULE

Detail No.	Beckman Stock No.	Description	Typical Manufacturer & No.	Qty./ Ass'y
	A855-436957 (A)	PC Board Assembly	Beckman	
C1	631-857298	Capacitor, F. Tant, Elect, 22 μ f, 25V	Comp. Inc. TSD5-25-226	1
C2	633-836864	Capacitor, F. Cerm, 0.01 μ f, 100V	Sprague C023B101F103M	1
CR1	755-420893	Diode, Special	Beckman	1
Q1, 3	755-846164	Transistor, PNP	Fairchild 2N4250	2
Q2	755-857274	Transistor, NPN	Fairchild 2N4275	1
Q4	755-838784	Transistor, NPN	Fairchild 2N3565	1
R1, 10	601-823904	Resistor, 100K	*AB CB1045	2
R2, 11	601-823913	Resistor, 560K	AB CB5645	2
R3, 12	601-823905	Resistor, 120K	AB CB1245	2
R4	601-823391	Resistor, 150 Ω	AB CB1515	1
R5, 8	601-822334	Resistor, 22K	AB CB2235	2
R6, 14	601-822328	Resistor, 2.2K	AB CB2225	2
R7, 9	601-822299	Resistor, 6.8K	AB CB6825	2
R13	601-822308	Resistor, 1K	AB CB1025	1
Z1	885-435206	I. C., Quad Two Input Gate, U6A900259X	Fairchild	1
J1	860-079512	Socket, Octal, PC Mount	Cinch 101-04-00-078	1
P1	678-099028	Connector, Plug, Header, Octal	Jones 8PB	1

*Allen Bradley, F. Comp., 1/4W, 5%



PC Board Assembly, IC Control Module



E. I. D. CUSTOMER SERVICE

Beckman's commitment to you begins with the design and development of a product to fill your needs. This commitment continues through manufacturing, delivery, and your application of the finished product.

Your investment in a Beckman product brings the added benefits of Beckman Customer Service, which began operating on your behalf in the research, development, and design of your instrument, and continues serving you through the life of your instrument. Over 32 years of demonstrated product and service performance continues to build customer confidence and satisfaction with Beckman.

Beckman's service commitment to you is in recognition of the stringent and diverse demands which must be met by your instrument or system. The specified performance you purchased must be met every time you need it, when you need it . . . and for as long as you need it.

In a continuing program to bring Beckman service closer to you, we maintain three regional service and repair centers in the United States: Fullerton, California; Schiller Park, Illinois; and Mountainside, New Jersey. To further expand our service capabilities, district service repair centers are in full operation at Huntsville, Alabama; Albuquerque, New Mexico; Boston, Massachusetts; Timonium, Maryland; Houston, Texas; and Detroit, Michigan.

The following pages describe the basic facets of customer service, available to you as a valued Beckman customer:

- *Beckman Warranty*
- *Accurate Technical Information*
- *Useful Technical Training*
- *Installation and On-Site Service*
- *Factory Repair Service*
- *Replacement Parts*
- *Service Contracts*
- *Modifications/Expansions*

Beckman Warranty

Every standard instrument produced by Beckman Instruments, Inc., carries with it a warranty. A statement accompanies each shipment describing our warranty conditions in detail.

Your purchase of a Beckman instrument reflects your confidence in the quality, materials, workmanship, product performance, and responsive service record of Beckman. The Beckman warranty is our expression of confidence and commitment that your instrument will deliver the economy and excellence of use which you expect of each Beckman product.

Technical Literature

Technical data sheets are available to you on every Beckman instrument. You need information which is complete, accurate, useful in your terms, and which truly assists you in making the best decision in product selection. Beckman continues to set industry standards in this area of real benefit to you.

Operating and Service Manuals are supplied with each instrument, to provide theory of operation, operating instruction, maintenance/calibration procedures, and a tabulation of replaceable parts. These manuals are available in quantity . . . even for older instruments which promise to deliver required performance for many more years.

Service and Application Notes cover special maintenance procedures, modifications, or useful calibration techniques. Knowledge of the full scope of instrument applications will optimize your use of Beckman products. Your Beckman Service Representative will be pleased to offer this literature to you upon request.

REPLACEMENT PARTS

Inventories

The response time you must have on instrument maintenance, either in your laboratory or at Beckman, is directly dependent upon immediate access to the required parts inventory. We have placed this stock of replacement parts closer to you by implementing active inventories in each of our three regional service centers across the United States. Check Sections II, III, and IV of this Directory for the service office nearest to your facility.

Parts Identification and Ordering

Every Beckman service office retains complete technical files to help you identify required parts. You will find a tabulation of replacement parts in the manual delivered with your instrument or system. Every one of your Beckman Field Specialists is ready to offer further assistance at any time.

Delivery

A replacement part is a critical item. Your request or order is filled the same day that it is received at the point where the part is stocked. A parts order which cannot be satisfied in five days or less will result in immediate notification to you with a statement of best delivery. You can depend on most parts orders being filled and shipped the day received.

When ordering a supply or replacement item, listing the Beckman stock number and its generic title as shown in your Operating and Service Manual will expedite the handling of your order.

REPAIR SERVICE

Factory Repair Service

Complete factory repair capability is maintained at each of our manufacturing facilities, covering every instrument and system on our product list. Factory Repair Centers for E.I.D. are as follows:

Richmond Products

*Beckman Instruments, Inc.
Electronic Instruments Division
2200 Wright Avenue
Richmond, California 94804
Attention: Factory Service Manager*

Schiller Park Products

*Beckman Instruments, Inc.
Electronic Instruments Division
P.O. Box 66204
Chicago, Illinois 60666
Attention: Factory Service Manager*

Fullerton Products

*Beckman Instruments, Inc.
Electronic Instruments Division
2400 Harbor Boulevard
Fullerton, California 92634
Attention: Factory Service Manager*

Regional Repair Capability

We have established and staffed regional repair centers at Fullerton, California; Schiller Park, Illinois; and Mountainside, New Jersey, to supplement our factory repair service. Complete repair facilities up to major overhaul and refurbishment are maintained at each regional service center. We feel that this type of service will prove to be a genuine benefit and will bring Beckman Service closer to our customers.

On-Site Repair Service

Beckman service specialists are factory-trained and equipped to effect many maintenance or repair actions right where your instrument is located—with *no* disruption to your operating schedules. Your timely use of this service can significantly reduce subsequent repair bills and costly “down time.”

Equipment and Personnel Standards

We are directing our entire effort toward a single objective—your satisfaction. Design and equipment excellence must be matched by similar excellence of our personnel working with you. To that end, we sustain a continuous and formal program of equipment, calibration, inspection, and personnel improvement. Your inputs help us to meet our objectives!

BECKMAN TOTAL SERVICE

The Electronic Instruments Division of Beckman Instruments, Inc., currently provides contract service on an annual, fixed-price basis to many customers. These clients have found both time and dollar economies are maximized in their operation when served by a Beckman Service Contract.

Beckman has successfully performed under this formal program for over eight years. Many clients have renewed these contracts year after year because it saved them money while maximizing continuous and efficient performance of their equipment.

With a planned investment in a Beckman *TOTAL SERVICE* Contract, you insure that your instruments are delivering optimum performance at all times. Some of our clients claim to have saved or made more money under a Beckman Service Contract than the original purchase price of the equipment. It's hard to beat that kind of economy.

A BECKMAN TOTAL SERVICE AGREEMENT provides:

- *Regular check-ups to insure proper operation.*
- *Coordination with your personnel to solve instrument or system problems.*
- *Refresher training for your operators.*
- *Emergency service consultation or calls.*
- *Parts replacement.*
- *Factory repair.*
- *System or instrument optimization twice a year, where all parts are checked for marginal operation; identification of aging components or sub-assemblies; tests are conducted to establish that the product meets or exceeds its original, as installed, accuracy specification; and a written statement is provided indicating that the product meets or exceeds its original accuracy specification.*

A BECKMAN MAINTENANCE SERVICE CONTRACT provides:

- *Beckman factory-trained field specialist(s) at your facility to conduct required training, maintenance and/or operation of your Beckman equipment.*
- *Services available to meet your requirements include all emergency repair service; on-call 24 hours; all maintenance and calibration; parts expediting and installation; factory repair expediting; modifications and refurbishment assistance; continuous optimization of instrument or system performance; and creating or up-grading software programs.*

Beckman's Service Contract performance is of field-proven benefit to you. Extensive data is available to you which demonstrates direct savings and other performance values. Beckman Service improves the usefulness and efficiency of each instrument or system purchased from Beckman throughout the entire life of the product.

POINTS OF CONTACT

Your Location	For Service, Call or Write:
Maine New Hampshire Vermont Massachusetts Connecticut Rhode Island	Beckman Instruments, Inc. Electronic Instruments Division 599 North Avenue Wakefield, Massachusetts 01880 Phone: (617) 245-6800 Attention: Service Manager
New York New Jersey Maryland Virginia West Virginia Washington, D.C.	Beckman Instruments, Inc. Electronic Instruments Division Route 22, Summit Road Mountainside, New Jersey 07092 Phone: (201) 232-7600 Attention: Service Manager
Tennessee North Carolina South Carolina Mississippi Alabama Georgia Florida	Beckman Instruments, Inc. Electronic Instruments Division 4306 Governors Drive, Suite R Huntsville, Alabama 35805 Phone: (205) 881-2383 Attention: Service Manager
North Dakota South Dakota Minnesota Wisconsin Nebraska Iowa Kansas Missouri Illinois Michigan Indiana Ohio Pennsylvania Kentucky	Beckman Instruments, Inc. Electronic Instruments Division P. O. Box 66204 Chicago, Illinois 60666 Phone: (312) 678-6225 Attention: Service Manager
Oklahoma Arkansas Texas Louisiana	Beckman Instruments, Inc. Electronic Instruments Division 5810 Hillcroft Avenue Houston, Texas 77036 Phone: (713) 781-0810 Attention: Service Manager
Montana Idaho Wyoming Utah Colorado Arizona New Mexico	Beckman Instruments, Inc. Electronic Instruments Division 4200-D Silver Avenue, S.E. Albuquerque, New Mexico 87108 Phone: (505) 265-8511 Attention: Service Manager
Washington Oregon Northern Nevada Northern California	Beckman Instruments, Inc. Electronic Instruments Division 2200 Wright Avenue Richmond, California 94804 Phone: (415) 526-7730 Attention: Service Manager
Southern California Southern Nevada	Beckman Instruments, Inc. Electronic Instruments Division 2400 Harbor Boulevard Fullerton, California 92634 Phone: (213) 691-0841 Attention: Service Manager

$$P = \frac{V^2}{R} = \frac{(1.1 \times 10^2)^2}{20}$$

$$= \frac{1.21 \times 10^4}{20}$$

$$= \frac{12.1 \times 10^3}{20}$$

$$= \frac{12.1 \times 10^3}{2 \times 10^1}$$

$$= 6 \times 10^2$$

$$= 600$$

$$I^2 R = 100$$

$$I^2 = \frac{100}{20} = 5 \text{ amp}$$

$$I = 2.424 \text{ amp.}$$

Beckman

INSTRUMENTS, INC.

ELECTRONIC INSTRUMENTS DIVISION

2200 WRIGHT AVENUE, RICHMOND, CALIFORNIA • 94804



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